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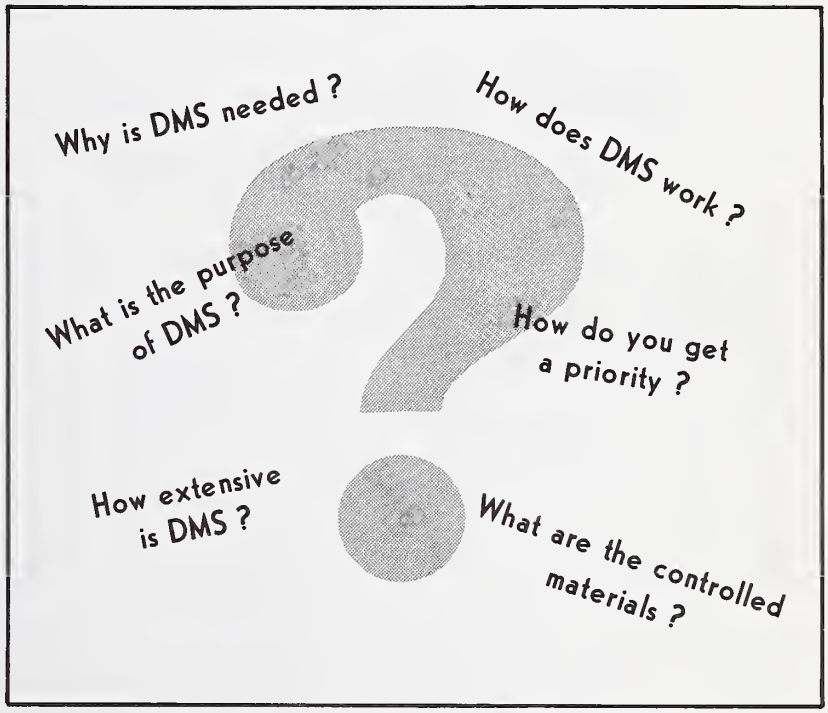
DEPARTMENTS

The Defense Materials System



In view of the many queries from defense industry on the priorities and allocations procedures of the Defense Materials System (DMS), the Business and Defense Services Administration, U. S. Department of Commerce, which administers the program, was invited to prepare an article for the *Bulletin*. The article which explains the purpose and operation of DMS begins on page 1 of this issue.

A complementary article, describing the use of DMS and priorities by the Defense Department and defense-related agencies, begins on page 8.

Jet-Powered Jeep Tests Device for Curing Dust Damage

Using a jet-propelled Army jeep, the Air Force's Office of Aerospace Research (OAR) is testing a new device in Arizona which hopefully will provide protection against the ill effects of dust on helicopters, trucks and other machinery in Vietnam where the situation is becoming a major problem.

The device, a clustered particle separator, was mounted on the air intake of the modified M–151 jeep during tests by scientists at the Aerospace Research Laboratories (ARL), Wright-Patterson AFB, Ohio.

After a series of preliminary experiments at Wright-Patterson, the jeep was flown to Arizona where it was subjected to dry desert dust tests.

The separator was devised by Dr. Hans J. P. von Ohain, chief scientist and senior research leader in the ARL energetics laboratory. Designed to prevent erosion of the compressor section in the engine and glass formation on the engine's hot surfaces, the separator removes dust particles and other foreign objects from the air before they can be sucked into the engine.

Estimates show that maintenance, including replacement of bearings and complete engines, on various jet aircraft engines afflicted by dust ingestion in Vietnam last year cost $100 million.

The Air Force hopes that the dust problem will be solved with the development of the separator, which should restore the life span of aircraft engines to a level comparable to that of engines operating under normal conditions.

New Helicopter Radar System Developed and Flight Tested

A unique and potentially revolutionary helicopter radar system has been developed and flight tested to increase the capability of a helicopter to fly at night and in foggy weather.

The development was accomplished under the long-range Joint Army-Navy Instrumentation Research (JANAIR) Program, under way for several years, which has the objective of improving and simplifying cockpit instrumentation display systems in fixed-wing aircraft and helicopters. The radar program is administered by the Office of Naval Research.

The system, which was developed by Bell Helicopter, Co., Fort Worth, Tex., with special radar equipment provided by Texas Instruments, Inc., Dallas, Tex., does not require a computer, mechanical components, or a servo system for its operation. This increases the system's reliability and maintainability and gives it the ruggedness to survive in a combat environment. The receiver and sweep generator are all-transistorized units.

Flight tests have demonstrated that contrast between objects and differing terrains is such that almost pictorial ground mapping results. Large or extended objects, such as airport runways or highways, are unmistakable and pilots, aided by photos, charts, or previous knowledge, can readily identify clusters of trees, buildings, or oil tanks. The display tube, which is a direct-view storage tube, also can provide a high resolution television picture if a television input is provided.

DEFENSE INDUSTRY BULLETIN

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The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, OXford 5-2709.

The Defense Materials System and Priorities

By
Anthony A. Bertsch

In this year of 1966 the issue of war and peace still looms as a most important factor in the shaping of our national policies and administrative efforts. The world situation today demands many unprecedented efforts to insure our national security.

The size and composition of our defense program dramatically symbolize such endeavors. Our involvement in Southeast Asia, the system of world-wide bases, the deployment of American forces in other parts of the world, foreign military aid, are a few other examples familiar to all Americans. There are other measures employed by the Government to protect our national security, however, which make important contributions to this goal but which are much less familiar to the general public. One of these is the operation of the Defense Materials System in our economy.

Why the Defense Materials System is needed.

The Defense Materials System (DMS) is a body of Government regulations, orders and procedures, issued under the authority of the Defense Production Act, designed to accomplish two main purposes. First, DMS is a means of directing the flow of materials and products to the nation's military, atomic energy and space production, construction and research and development programs. These programs are referred to as "defense programs." DMS helps insure that defense programs are maintained on schedule by providing a priority for the purchase of materials by contractors, subcontractors and their suppliers. Second, the operation of the system results in the maintenance of an administrative means of promptly mobilizing the total economic resources of the country in the event of war.

The priorities provided under DMS are required to insure a timely flow of materials and components to the defense programs, atomic energy developments, and programs for missile systems and space. In addition, the supplies and equipment needed to assure the combat effectiveness of our military forces in South Vietnam are obviously important to our national security. Other less obvious programs are also important to assure the security of our nation.

Considering the enormous sums appropriated for these purposes and recognizing the tremendous importance of these programs in the light of the continuing world situation, the operation of DMS represents a very small premium which we are paying for a substantial insurance coverage. Even in times of generally ample supply, certain materials and components are relatively scarce for a variety of reasons. In some cases unusual specifications create supply difficulties, both with respect to materials and the industrial facilities needed to process them. The situation with regard to ample supply of many materials or products may change overnight as a result of special situations such as strikes or international incidents. Fluctuations in the general economic situation may also affect the availability of materials needed for defense programs. The operation of DMS minimizes the effects of these various industrial and economic factors on defense programs.

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A strong and ready industry is as much a part of our national defense as a competent military organization. Industry's contribution to our national security, both under present conditions of the cold war or a possible enlarged war situation, cannot be determined by the military alone or by any particular civilian branch of our Government. The atomic age, and now the space age, have developed a partnership between Government and industry under which cooperative efforts will assure the strength of our nation to meet any threat to our nation's security.

Authority.

Under Title I of the Defense Production Act of 1950, as amended, the President is authorized to establish priorities in the performance of contracts or orders necessary to promote the national defense and to require the acceptance and performance of such contracts or orders for the purpose of assuring such priorities. He is also authorized, under the same title, to allocate materials and facilities for the purpose of promoting the national defense. The term "national defense" is defined in the Defense Production Act as ". . . programs for military and atomic energy production or construction, military assistance to any foreign nation, stockpiling, and directly related activity."

These priority and allocation powers are administered by the Business and Defense Services Administration of the Department of Commerce under delegation from the Secretary of Commerce, to whom they have been delegated by the President through the Director of the Office of Emergency Planning (OEP). This delegation relates to the broad field of industrial production and materials, as well as construction and research and development. Certain other Government agencies such as the Department of Agriculture, Department of Interior and Interstate Commerce Commission have been delegated priority and allocation powers with respect to certain products, materials and services coming under their jurisdiction. The administration of these powers with respect to industrial production and most materials is accomplished through a

series of regulations and orders designated as the Defense Materials System.

In delegating these authorities to the Secretary of Commerce, OEP has retained general policy guidance and coordination of the exercise of these powers by the Department of Commerce and the other delegate agencies. OEP has also retained the general program function.

An important feature of DMS is the fact that the use of priorities for defense programs is mandatory and not optional. This assures full support to defense programs and provides the Government with a source of essential statistical information regarding the impact of the defense programs on the economy as a whole.

Historical background.

The experience of World War II and the Korean Conflict has shown that converting industry from peacetime to wartime objectives has beeen and can be a time-consuming task. From the entrance of the United States into World War II after the attack on Pearl Harbor it took well over a year to develop a fully effective system of industrial controls to support the war effort. After a period of trial and error in the use of priorities and allocations, the War Production Board developed a system, the Controlled Materials Plan (CMP), which became effective early in 1943. Once under way CMP was instrumental in providing the sinews required to conduct the most extensive military operation in our history.

The principles of CMP were essentially simple. Its purpose was to balance the supply of industrial resources with the requirements of the nation to prosecute the war to a successful conclusion. It was determined after careful analysis that three basic materials, steel, copper and aluminum, constituted a common denominator on the basis of which most of the industrial requirements for both military needs and the needs of the civilian economy could be measured. These three materials were designated the "controlled materials." The total supply of controlled materials was determined quarterly and the military and civilian requirements, established by the responsible Government agencies, were collected and measured in terms of the controlled materials needed to accomplish them. A balance was established between the available supply and the total requirements by adjusting the requirements on a time-phased basis and on the basis of essentiality.

This process of assessment and balance was conducted by the Requirements Committee of the War Production Board. The operations of this supply-requirements analysis procedure resulted in a series of balanced programs for military and civilian needs. The Requirements Committee issued allotments of controlled materials to each of the Government agencies involved which were designated "claimant agencies." The claimant agencies then allotted appropriate quantities of controlled materials to and authorized the use of priority ratings by contractors and suppliers. In this way individual producers of needed products, equipment and materials were assured of a designated supply of the three controlled materials and were authorized to use priorities to obtain the necessary supporting components and materials to complete their schedules.

Despite the experience gained in World War II, when the United States entered the Korean Conflict in the summer of 1950, it again took a year for the National Production Authority (NPA) to install and make effective a modified version of CMP to direct the flow of products and materials into programs essential to the successful consummation of that effort. This was accomplished under authority provided in the Defense Production Act of 1950.

When the Korean War ended by mid-1953 there was finally an awareness of the need for improving our preparedness position for industrial mobilization to meet any future emergency. The renewal of the Defense Production Act in 1953 reflected the concern of both Congress and the Executive Branch of the Government with achieving a continuing state of readiness for effective mobilization, resulting from the unsettled world situation. Of equal importance was the recognition by industry leaders that industry itself had a vital stake in the maintenance of a system in being to meet the continued heavy defense requirements and as a readiness measure which could be promptly expanded to meet the needs of an emergency situation. There was general agreement among responsible Government and industry representatives that only by the continued operation of a set of Government rules designed to accomplish this purpose could we achieve the industrial goals necessary to our national security and be ready for the accelerated and changed industrial activity which might be required in the event of another national emergency. On the basis of this consensus DMS was established shortly before the end of the Korean War.

DMS is a greatly simplified version of the Controlled Materials Plan which was in effect during the Korean War and is limited in its operation to defense programs. It has been in continuous operation since July 1, 1953, but has been greatly simplified since its inception.

The priorities system helps the defense contractor or subcontractor to obtain the materials and products needed to fill defense orders on time. DMS regulations, orders and procedures are designed to assure the contractor preferential treatment to meet his defense commitments. Bear in mind that our present stepped up military requirements for defense, at home and abroad, come at a time when our economy is operating close to its overall capacity. Under these conditions, the priority system should enable us to meet our military requirements without the imposition of civilian controls. Also bear in mind that our Government must be in a position to see that the materials and equipment needed to support our defense effort are supplied on time and in the right amounts.

The purpose of this article is to give readers of the *Defense Industry Bulletin* a better understanding of:

- The purpose of DMS.
- Its method of operation and its procedures.
- Industry responsibilities, obligations and benefits under DMS whether a defense prime contractor, a subcontractor, or a supplier.

What is DMS and what are its purposes?

As previously stated, DMS is a series of Government regulations, orders and procedures issued under the authority of the Defense Production Act. It is designed to accomplish two main purposes:

- It is a means of directing the flow of materials and products to the production, construction and research

and development requirements of the nation's defense programs. DMS helps to insure that these defense programs are maintained on schedule by providing a priority for the purchase of materials by defense contractors, subcontractors and their suppliers.

• The operation of DMS permits the maintenance of an administrative means of promptly mobilizing the industrial resources of the country in a limited or general war.

DMS is not a standby system of priorities. It is in operation right now and has been operative since 1953 and, because of it, this nation is better equipped to meet its military commitments in South Vietnam than it was in previous conflicts.

How extensive is DMS?

DMS is limited in its application to the programs of the Defense Department, the Atomic Energy Commission, the National Aeronautics and Space Administration, and certain "associated agencies" of DOD responsible for specific defense-related programs. There are only 34 defense and defense-related programs to which the DMS rules apply. A list of these programs is shown in Figure 1. DMS rules do not apply to civilian production nor do they apply to procurement of Government agencies other than those with assigned defense responsibilities.

Defense Programs Covered by the Defense Materials System

Program identification	Program	Defense agency
	For Department of Defense and associated programs	
A-1	Aircraft	Dept. of Defense: Army. Navy (including Coast Guard). Air Force.
A-2	Missiles	
A-3	Ships	
A-4	Tank—Automotive	
A-5	Weapons	
A-6	Ammunition	
A-7	Electronic and Communications Equipment	
B-1	Military Building Supplies	Associated Agencies of Dept. of Defense: CIA.* FAA.* NASA.*
B-8	Production Equipment (for defense contractor's account)	
B-9	Production Equipment (Government-owned)	
C-2	Department of Defense Construction	
C-3	Maintenance, Repair and Operating Supplies (MRO) for Department of Defense Facilities	
C-8	Controlled Materials for Naval Stock Account	
C-9	Miscellaneous	
	For Atomic Energy Commission programs	
E-1	Construction	AEC.*
E-2	Operations—including Maintenance, Repair and Operating Supplies (MRO)	
E-3	Privately Owned Facilities	
	For other Defense, Atomic Energy and related programs	
B-5	Certain self-authorizing consumers (see sec. 9(d) of DMS Reg. 1)	BDSA.*
C-4	Certain munitions items purchased by friendly foreign governments through domestic commercial channels for export	
C-5	Canadian Military Programs	
C-6	Certain direct defense needs of friendly foreign governments other than Canada	
D-1	Controlled Materials Producers	
D-2 [1]	Approved state and local civil defense programs	
D-3	Further Converters (Steel)	
D-4	Private domestic production	
D-5	Private domestic construction	
D-6	Canadian production and construction	
D-7	Friendly foreign nations (other than Canada) production and construction	
D-8	Distributors of controlled materials	
D-9	Maintenance, Repair and Operating Supplies (MRO) (see Dir. 1 to DMS Reg. 1)	
E-4	Canadian Atomic Energy Program	
K-1	General Services Administration's Stores Depot Program	
AM	Aluminum Controlled Materials Producers	
AM-9000	Aluminum Controlled Materials Distributors	
FC	Further Converters (steel and nickel alloys)	

* Abbreviations as follows:
AEC—Atomic Energy Commission.
BDSA—Business and Defense Services Administration.
CIA—Central Intelligence Agency.
FAA—Federal Aviation Agency.
NASA—National Aeronautics and Space Administration.

[1] State and local governments will be authorized to use the program identification symbol D-2 only upon application to the Office of Civil Defense of the Department of Defense, sponsorship by the Office of Assistant Secretary of Defense (Installations and Logistics) and specific approval by BDSA.

Figure 1.

How does DMS work?

It works by the use of priorities and the allocation of certain controlled materials for defense and related programs. First, let us examine priorities and later we will consider the controlled materials.

How does one get a priority?

There are only two ways in which a priority can be obtained. One is from a Government agency, the other is from the customer. It should be emphasized that it is mandatory that all contracts or purchase orders for defense programs be identified by a priority. This applies equally to the Government agency that places the order or awards the contract, the defense contractor who places an order with a supplier or subcontractor, and the supplier or subcontractor as well.

For example, when the Air Force places a contract for aircraft it will use the priority DO–A–1. Similarly an Atomic Energy Commission construction contract would have the priority DO–E–1. And a subcontractor for the aircraft manufacturer would get an order with the same DO–A–1 priority.

There are two kinds of priorities: One is a rated order, which will be discussed at this point, and the other is an authorized controlled material (ACM) order, which will be described later. ACM orders are used to get controlled materials—steel, copper, aluminum and nickel alloys. Rated orders are used to get other materials and products. A rated order must contain these four elements:

• The priority rating—which consists of the prefix DO or DX, followed by the appropriate program identification, such as A–1, E–1, etc.

• Either of the following certifications: "Certified for national defense use under DMS Regulation 1" or "Certified under BDSA Regulation

2." Either of these certifications is acceptable on a rated order.

- The signature of an authorzied official of the firm placing the rated order.
- The delivery date or dates required.

The purchaser or Government agency must also furnish the supplier with a statement reading substantially as follows:

> "You are required to follow the provisions of DMS Regulation 1 and of all other applicable regulations and orders of BDSA in obtaining controlled materials and other products and materials needed to fill this order."

This statement must appear on the order or on a separate piece of paper attached to the order.

Figure 2 shows a sample DO-rated order. When a rating is used on the purchase order, it must contain the four elements just mentioned and which are circled in the illustration.

The certification on purchase orders must be signed by the person placing the order or by a responsible individual who is duly authorized to sign for that purpose.

DMS is a complete system because the rating authority that originates with the Government defense agency is passed down and used throughout the entire chain of supply to fill the original rated contract or purchase order. The mandatory use of ratings protects the priority status of the procurement cycle and it also applies to replacements in inventory of products and materials used to fill rated orders. The only exception to the mandatory use of ratings is an optional exception for individual purchase orders of $500 or less.

What is the preferential status of a rated order?

There are two types of priority ratings: DO ratings and DX ratings. The letters DO and DX are the rating symbols. A complete priority rating consists of one of these rating symbols plus the appropriate program identification, for example, DO–A–1 or DX–A–2. The program identification does not affect the preferential status of the rating. All DO ratings have equal preferential value. A DO–A–1 has the same status as a DO–C–2. DO-rated orders take precedence over unrated orders. All DX ratings have equal preferential value but DX-rated orders take precedence over DO-rated orders and unrated orders. It is emphasized that a DX rating is really a super-priority, which is used to a very limited extent. It is used primarily for specially designated defense programs of the highest priority.

What rules apply to the acceptance of rated orders?

Every rated order must be accepted and filled regardless of existing contracts and orders, except under the following circumstances:

- If the prospective purchaser is unwilling or unable to meet the vendor's regularly established prices or terms of sale or payment.
- If the rated order is for a product or a service which the supplier does not usually make or perform.
- If the rated order is for a product or material which the supplier makes or acquires for his own use.
- If filling the rated order would stop or interrupt the supplier's operations during the next 60 days in a way which would cause a substantial loss of total production or a substantial delay in operations.
- If the rated order is placed by a person who produces the same product or performs the same service as that ordered.

Sample DO Rated Order

PURCHASE ORDER

ABC MANUFACTURING COMPANY
1000 4th Street
Lexington, Morylond 20601

Please ship to the above oddress unless otherwise indicoted

TO: Anson & Whiting, Inc.
P.O. Box 111,
Lukensville, Virginia 22002

Our Order No. 2112

Dote of Order 6/1/66

Show our Order No. on popers ond packoges.

Quantity	Description	Price
10	Model J-804 Copper Ejectors Per Ord. Drwg. No. 3314K Point of Manufacture: Lukensville, Virginia Government Source Inspection is required prior to shipment from your plant. When material is ready for inspection or, if practical, ten (10) days in advance thereof, notify the Government Representative who normally services your plant. Commercial Packaging (Pack for arrival in good condition) Government Contract No. XA-12-040 Ord-1001 Priority Rating DO-A-1. Certified for national defense use under DMS Regulation 1. You are required to follow the provisions of DMS Reg. 1 and of all other applicable regulations and orders of BDSA in obtaining controlled materials and other products and materials needed to fill this order. Ship as follows: 5 units July 1, 1966 5 units July 8, 1966	

Required Shipping Dote	Routing	Mark Shipment
As above		MABA Transport

Account Code	
AW - 401 - 22	(Signed) Henry Arnett, Mgr. Purchasing Authorized Signature ond Title
ACKNOWLEDGEMENT–CONDITIONS	TERMS OF PAYMENT

Figure 2.

• If the rated order would interfere with delivery of any rated order which has already been accepted. However, a DX-rated order must be accepted without regard to the effect of such acceptance upon the filling of unrated or DO-rated orders.

In general, rated orders must be filled by the required delivery date. If a contractor does not expect to be able to fill a rated order by the time requested, he must not accept it for delivery at that time. He must either reject the order, stating when he could fill it, or accept it for delivery on the earliest date he expects to be able to deliver, informing the customer of that date.

How is a rating used?

If a contractor receives a rated contract or order, he must use the rating to purchase the products and materials he needs to fill the order or to replace inventory used to fill the order.

If a contractor accepts a rated order and finds it necessary to delay delivery on an unrated order, he is protected from any legal action his customer may take because of such delay. This is a very important protection provided by the Defense Production Act and BDSA Regulation 2.

Up to this point, the general purpose of DMS has been discussed, the defense programs to which it applies, the technical nature of a priority and how it is obtained and used; but DMS as a complete system has not really been covered.

Earlier it was indicated that the basic principles, rules and procedures are embodied in a series of regulations and orders. (A listing of these regulations, orders and related actions may be found on page 38 of this issue. These documents can be obtained from any Department of Commerce Field Office. A listing of the field offices may be found on page 40.) The two primary regulations in the system are DMS Regulation 1 and BDSA Regulation 2. BDSA Regulation 2 sets forth the basic rules of the priorities system and DMS Regulation 1 sets forth the basic rules of the Defense Materials System.

DMS Regulation 1 applies to production, construction and research and development for defense programs involving the use of controlled materials—steel, copper, aluminum and nickel alloys, whereas BDSA Regulation 2 contains the rules and procedures which apply to the procurement of other products and materials. In addition, there are seven M-orders relating to production, delivery and distribution of certain materials and products.

What are the controlled materials?

There are four controlled materials —steel, copper, aluminum and nickel alloys—which are divided into eight categories as follows:

• Carbon Steel (including wrought iron).
• Alloy steel (except stainless steel).
• Stainless steel.
• Copper and copper-base alloy brass mill products.
• Copper wire mill products.
• Copper and copper-base alloy foundry products.
• Aluminum.
• Nickel alloys.

Each of these eight categories is further broken down into the various forms and shapes of the four basic materials, e.g., sheet, strip, rods, bars, wire, etc. These are listed in Schedule 1 of DMS Regulation 1.

The eight categories are used for the purpose of making allotments which will be covered later.

Defense agencies contract for or buy directly a wide variety of items. These cover virtually every aspect of our industrial economy including construction, research and development, military hard goods, common use items, and a wide variety of soft goods, including chemicals and medicinals. We have tried to organize this great variety of items into a limited number of categories which would be manageable under our priorities system.

With this in mind, we have established a category of items containing controlled materials made to military specifications which we call Class A products. As a matter of convenience, both construction and research and development are classified as Class A products. These include not only such obvious military items as ships, tanks, and guns, but also the specialized components going into these major products.

A second category we have established is called Class B products which are, in general, common-use items containing controlled materials and which are normally made by manufacturers for off-the-shelf sale. Such items as fractional horsepower motors, machine tools, nuts and bolts, and a vast variety of other items are included in this general category.

The third broad category carries no classification at all since it includes all the other items which generally do not contain controlled materials such as uniforms, fabrics, bedding, medicines, chemicals and many other things.

When a defense agency places a contract for a Class A product, the contract or purchase order carries a priority rating. If the contract is for defense production or research and development, the prime contractor is required to submit an application, on Form DMS–4A, to the agency from which he received the contract specifying the quantities of controlled materials he needs to fill the contract. If it is a construction contract, the contractor has to submit an application on Form DMS–4C. The defense agency involved, which we call an allotting agency, then issues an allotment of the requested amounts of controlled materials to the contractor with an authorization to use the appropriate rating and program identification. The priority rating consists of the rating symbol, DO or DX, and a program identification, for example A–1, which means aircraft. The contractor is now required to use the symbol A–1 to place priority orders for controlled materials, and the priority rating DO–A–1 to get other materials and products needed to fill the contract.

If the prime contractor needs to buy Class A products which are specially designed components, he merely places a rated order with his supplier but does not give his supplier an allotment of controlled materials. The only ones who ever receive an allotment of controlled materials are prime contractors for the production of Class A products. If a contractor receives a prime contract for the production of Class B products, he does not get an allotment of controlled materials from the defense agency. He merely gets a rating with his contract.

Anyone, whether he is a prime contractor or a subcontractor, who has received a rated order without an allotment is nevertheless authorized to use a priority to obtain controlled materials. We call this priority an Authorized Controlled Material order or, more commonly, an ACM order.

This can be stated in a slightly dif-

ferent but summarized form. A contractor who receives a prime contract from a defense agency for Class A products gets an allotment and an authorization to use a priority. In DMS Regulation 1, these contractors are called prime consumers. Contractors, who receive prime contracts for Class B products, and sub-contractors, who receive rated orders for Class A products or Class B products, do not receive an allotment from anyone but they do receive a rating. These contractors or suppliers are called self-authorizing consumers in contrast to those who are called prime consumers. The reason we use the term self-authorizing consumer is because they do not have to submit an application to get an allotment and authorization but instead use the provision in the regulation which authorizes them to place ACM orders to get controlled materials.

In making application for an allotment, the prime consumer must include the total quantity of controlled materials required to fill the contract. This includes the quantities of controlled materials for his own use as well as those required by his suppliers from whom he purchases Class A products that are to be incorporated in his product.

If a prime contractor needs information regarding the controlled-material requirements of any of his suppliers of Class A products, he may request them to submit this information on Form DMS–6. A facsimile of the form is contained in Schedule V of DMS Regulation 1. This form is not supplied by the Government; however, the prime contractor may duplicate this form. The use of the form is not limited to prime contractors but may, in turn, be used by his suppliers of Class A products to obtain the necessary information from their suppliers of Class A products.

What is an ACM order?

An ACM (Authorized Controlled Material) order means any purchase order for any controlled material (as distinct from a product containing controlled material) which is placed pursuant to an allotment of controlled material or pursuant to self-authorization.

How is an ACM order placed?

Figure 3 shows a sample ACM order. All ACM orders must contain the four elements that are circled in the illustration in addition to the basic data on the purchase order. These elements are:

- The required delivery date.
- Statement on applicability of BDSA regulations and orders
- The allotment number and certification.
- Authorized signature of a responsible official.

A word about the allotment number. You will observe that it consists of the program symbol, e.g., A–1, plus the calendar quarter for which the allotment is valid. In the case of an ACM order of a self-authorizing consumer, the calendar quarter identification is the delivery date requested. This should not pose any problem because the basic form of the allotment number is the same for a prime consumer or a self-authorizing consumer. If the contract or purchase order is a DX-rated order, the DX designation must be added as a suffix to the allotment number, e.g., A–4, 3Q66–DX and the order thus becomes an ACM–DX order. An ACM–DX order is entitled to priority in acceptance or delivery over other ACM orders.

What are the general rules regarding placement of ACM orders?

- All defense contractors, either prime consumers or self-authorizing consumers, must place ACM orders to obtain the controlled materials needed to fill a rated contract or order.

Sample ACM Order

STRUCTURES, INC.

1000 Longview Avenue
Tennyson, Illinois 62370

DATE February 1, 1966
PURCHASE ORDER NO. 9212
SHIP VIA Motor Freight

TO: Ajax Metals, Inc.
400 Water Street,
Cranston, New Jersey 08210

SHIP TO: Structures, Inc.
As above.

CONTRACT NO. DA-98-031-ENG-9623

SPECIFICATION To Federal Specification QQS-741A, Type 1, Class 1.

REQUIRED DELIVERY DATE:
April 1, 1966

Item	Number Pieces	Shape	Size	Length	Total Weight	Notations
1	3	Beam	24" - 120#	27' - 10½"	10,035#	
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

Above contract carries rating DO-A-2.

You are required to follow the provisions of DMS Reg. 1 and of all other applicable regulations and orders of BDSA in obtaining controlled materials and other products and materials needed to fill this order.

Allotment Number A-2-3Q66. Certified for national defense use under DMS Regulation 1.

(Signed)
John Smith
Manager of Purchasing

Authorized signature

Figure 3.

• ACM orders must not call for delivery of any controlled materials in an amount greater than required to fill rated orders. The exception is where such quantities would be less than the minimum mill quantities listed in Schedule IV of DMS Regulation 1, and are not procurable from a distributor. In such cases, an ACM order may be placed for the full minimum shown on that schedule and the delivery of that quantity may be accepted by the supplier.

• The mandatory use of ACM orders need not be followed if the individual purchase order is in an amount of $500 or less.

• The mandatory use of ACM orders applies not only to the procurement of controlled materials to fill defense-rated orders, but also to the replacement in inventory of such materials used to fill such orders.

What are the general rules regarding acceptance of ACM orders?

Producers of controlled materials are required to accept all ACM orders except under the following circumstances:

• If the order is received after commencement of lead time as listed in Schedule III of DMS Regulation 1.

• If the order is for less than the minimum mill quantity shown in Schedule IV of DMS Regulation 1.

• If the prospective purchaser is unwilling or unable to meet the supplier's regularly established prices and terms of sale and payment.

• If the order need not be accepted under any of the individual controlled material M-orders.

• In the case of ACM–DX orders, the producer must accept them without regard to lead time or set-asides unless it is impracticable to make delivery within the required delivery month, in which case he must accept the ACM–DX order for the earliest practicable delivery date and so notify his customer.

Controlled materials distributors must accept all ACM orders except under the following conditions:

• If the order is not for immediate delivery.

• If he does not have the material in stock, unless it is ordered and he knows that it is in transit to him.

• If the prospective customer is unwilling to meet the distributor's regularly established prices and terms of sale or payment.

• If the order need not be accepted under any of the individual controlled material M-orders.

Up to this point, some of the essential elements of the Defense Materials System and priorities as embodied in DMS Regulation 1 and BDSA Regulation 2 have been discussed. In addition to these regulations, certain rules are applicable to particular controlled materials and particular products. These rules are contained in BDSA M–orders (see listing on page 38).

The fact cannot be emphasized too strongly that contractors must become familiar with the regulations and orders; this article is not meant to substitute for the actual regulations and orders.

Some of these M–orders contain set-aside provisions whereby producers of controlled materials and certain products are required to reserve a portion of their production to fill rated orders. This is done to assure that an adequate supply of these materials will be available to fill priority orders.

There are several other items that should be mentioned. If a contractor accepts a rated order he must use the rating to obtain containers and packaging material needed to make delivery, and it must be used to obtain chemicals needed in the production of the item.

A rated order or an ACM order may not be used to obtain capital equipment or for the purpose of plant expansion or improvements. If inability to obtain capital equipment would result in the failure to fill a rated order that has been accepted, an application for a rating for such capital equipment should be made to the responsible allotting agency.

Maintenance, repair and operating supplies (MRO) may be obtained in accordance with the provisions of DMS Regulation 1, Direction 1. This directive provides for the use of a DO–D–9 rating for MRO and for the allotment number D–9 on ACM orders for controlled materials needed for MRO, but only if inability to obtain MRO would prevent a contractor from filling a rated order.

There is one problem which many contractors have already encountered, i.e., what does a contractor do if he is having difficulty in getting what he needs after a rated order has been placed? We all know that there are situations in which there are delivery delays or bottlenecks even though an order has been rated. For example, there can be conflicting rated orders on the supplier's schedule, there might be inadequate facilities to produce the particular item, and others. BDSA has set up a procedure to provide special assistance for defense contractors and suppliers when the regular DMS and priority procedures are ineffective.

In such circumstances, the defense contractor may submit a request for special assistance on Form BDSAF–138 to the procuring or allotting agency involved. If the agency is unable to overcome the difficulty, the request is forwarded to BDSA for action.

We will attempt to expedite the deliveries or correct the bottleneck situation by negotiating with the supplier, locating other sources, or by other means. We might use one of several methods such as:

• Arrangement of improved delivery dates by informal agreement with the supplier.

• Issuance of a directive requiring the supplier to produce or deliver the specific item by a specified date.

This is always done in cooperation with the supplier and the defense agency involved.

A directive issued by BDSA takes precedence over all preferential orders, depending upon the terms of the directive. An example of directive action would be the rescheduling of the production and deliveries of a particular supplier to meet the needs of the defense agency involved.

Copies of Form BDSAF–138 may be obtained from the office administering the contract or from any Department of Commerce Field Office.

It should be emphasized that BDSA will not and cannot undertake to provide such assistance unless and until the contractor has exhausted every means at his disposal.

If a contractor is engaged in defense work he must be familiar with DMS rules and procedures. This is a responsibility of all defense contractors which is absolutely essential if they are to make their maximum contribution to our national security. We have designed the DMS and priorities system to aid both the contractor and the Government.

(Editor's Note: See list of BDSA regulations beginning on page 38; list of U. S. Department of Commerce Field Offices on page 40.)

The Use of DMS and Priorities by the DOD and Defense-Related Agencies

By
S. M. Matelski, Jr.

Under the rules and regulations by the Defense Materials System (DMS) the Business and Defense Services Administration (BDSA) has delegated to the Secretary of Defense and the Chairman of the Atomic Energy Commission three main priorities and allocations authorities, namely, to rate their contracts and orders with DX or DO; to assign the right to apply the DX or DO ratings for capital equipment; and to allocate steel, copper, aluminum and nickel alloys for their Class A products. The Secretary of Defense has delegated these powers to the Assistant Secretary of Defense (Installations and Logistics). These powers, in turn, have been delegated by the Assistant Secretary of Defense (Installations and Logistics) to the Army, Navy, Air Force, Defense Supply Agency, Defense Communications Agency and the Defense Atomic Support Agency.

Certain other agencies, for programs approved by the Office of Emergency Planning, operate under letter delegations from the Assistant Secretary of Defense (Installations and Logistics). These approved programs and their administering agencies are:

- Space programs by the National Aeronautics and Space Administration.
- Civil Air Carrier Program; Airline Maintenance, Repair and Operating Supplies Program; and the Air Navigational Aids Program by the Federal Aviation Agency.
- Selected Intelligence Programs by the Central Intelligence Agency.
- Stores Depot Program by the General Services Administration.

Written delegations authorizing the use of these priorities powers are made to the contracting officers in the Military Departments, Defense Supply Agency and the other agencies mentioned above.

At this point in time and since 1959, it has been and is mandatory that the procurement contracting officers rate all their contracts and orders with a few minor limitations imposed on DOD by BDSA. Examples of these limitations for which ratings cannot be used are:

- Civilian-type items procured for resale in post or base exchanges.
- Food or petroleum products except their packaging containers and chemicals used or needed to process such products.
- Services per se.
- Construction equipment procured for use in the United States.
- Army Civil Works Program.

Contracts and orders under $500 do not have to be rated under BDSA regulations; however, DOD practice is to rate these small orders and contractors are urged to do likewise for their protection.

DOD procurement contracting officers have to know those contracts and orders which must be rated DX and those which must be rated DO. To clarify this, it will be necessary to discuss the DOD Master Urgency List.

DOD maintains a classified DOD Master Urgency List, for use within Government only, which contains programs of highest national urgency (first category); programs of highest DOD urgency (second category); and other important DOD and Canadian military programs (third category). This list is used for three main purposes within the Government as follows:

- To inform the procurement contracting officers of those contracts and orders which must be rated DX.
- As internal guidance for utilization of in-house resources on a first-things-first basis.
- To resolve conflicts for production resources in the Special Assistance Program which will be discussed in more detail later.

Stanley M. Matelski Jr. is Special Asst. for Priorities and Allocations in the Office of the Asst. Secretary of Defense (Installations & Logistics). He has served in positions related to the priorities and allocations field within OASD(I&L) since 1954, and has had 25 years experience in Government procurement and production.

Under the written delegations to the procurement contracting officers, they must rate contracts and orders in support of the highest national category programs listed in the first category of the Master Urgency List with the DX rating. These programs are approved by the President of the United States, are very few in number, are limited in dollar volume, and are deemed of such importance that every authority we have is used to prevent them from getting into trouble or from being delayed. This does not mean that all requirements to fill an entire program are ordered for delivery at once. DOD instructions stress the early placement of orders and the establishment of realistic, phased contract schedules by the programming offices to enable timely deliveries to meet the compressed operational dates usually inherent in these top urgent programs.

At present the DX programs are 13 in number and are known as "Brick-Bat .01" programs. Ten are administered by DOD, two are administered by the National Aeronautics and Space Administration and one by the Federal Aviation Agency. The total annual dollar volume of all 13 programs is less than 25 percent of total ratable procurement, which is the limit placed on these programs to keep the DX program rating meaningful. The second category, known as "Brick-Bat Other Than .01," contains 39 highest DOD urgency programs, and the third category, "Cue-Cap," contains 20 DOD and Canadian military programs of lesser importance. This list is revised on a continuing basis to reflect current conditions. DOD instructions prohibit the use of the Brick-

Bat .01, Brick-Bat Other Than .01 and Cue-Cap urgency category designation on industrial paper since this is an internal system for the three internal governmental uses described above.

As stated earlier, the procurement contracting officers must rate contracts and orders in support of "Brick-Bat .01" programs with the DX rating. Almost all other DOD procurement is rated DO by the procurement contracting officers. Again, our instructions stress the early placement of these contracts and orders with realistic, phased contract schedules.

The DX and DO ratings are fully extendible throughout the industrial chain. It is mandatory that contractors and suppliers extend these ratings for materials, components and subassemblies to be physically incorporated in the contract items, with one exception. The exception is that DX and DO ratings are not extendible for the various forms and shapes of the controlled materials—steel, copper, aluminum and nickel alloys—since authorized controlled materials orders (ACMO's) must be placed for these materials under DMS regulations.

Let us assume that all rated contracts and orders have been placed and accepted, and a contractor is in a position where he has all materials and components for timely manufacture and delivery of the contract item except the controlled materials.

The question now is, how does a contractor assure timely deliveries of the forms and shapes of the controlled materials needed for his contract?

This is accomplished through the Defense Materials System which is essentially a bank and check system. Based on phased quarterly program controlled materials needs (submitted to DOD by the prime contractors on DMS–4A applications for production and research and development contracts, and on DMS–4C applications for construction contracts) and on any new program needs known to DOD, quarterly phased controlled materials requirements are submitted to the Office of Emergency Planning and, in turn, to BDSA, Washington, D. C. BDSA, having DOD controlled materials requirements, Atomic Energy Commission (AEC) controlled materials requirements, and the Class B product controlled materials requirements, establishes a set-aside—which can be considered as a bank—for each controlled material producer, sufficient to cover all rated orders.

Meanwhile, the Office of Emergency Planning makes a bulk allocation to DOD and AEC. The Office of the Assistant Secretary of Defense (Installations and Logistics)—OASD(I&L)—reallocates to the Military Departments, Defense Supply Agency, National Aeronautics and Space Administration and the Federal Aviation Agency sufficient controlled materials for their needs. These allocations, in turn, are passed to the allotting offices who make allotments to the prime contractors on DMS Forms 10, if production, or DMS Form 13, if construction, based on their DMS–4A and DMS–4C applications, respectively.

Using these allotments, prime contractors place authorized controlled materials orders (ACMO's) on the controlled materials producers or distributors. Subcontractors are informed by their prime contractors that they will self-authorize ACMO's for certain quantities of the controlled materials, which were included on the prime contractors' DMS–4A or 4C applications. Other subcontractors must self-authorize ACMO's for only those quantities of controlled materials needed to fill rated orders that they have received and accepted. The ACMO's can be considered as the checks issued against the set-asides, or the bank, as mentioned earlier. If the producer's set-aside is filled or order leadtime has commenced, he may reject ACMO's, except those identified with a DX suffix. In such cases contractors must shop with other producers for placement of their orders, thus forcing an equitable distribution of rated business with all producers of the controlled material involved.

Under the simplified Defense Materials System today, allotment records are kept only by the prime contractors to minimize workload and costs in industry. Subcontractors do not keep allotment records since the prime contractors write-off on their books the quantities that they inform the subcontractors to self authorize.

Monthly and quarterly usage reports of the controlled materials are submitted through the same Government channels by OASD (I & L) and the Atomic Energy Commission to the Office of Emergency Planning. Quarterly shipment reports are submitted to the Business and Defense Services Administration by the controlled materials producers and, in turn, to the Office of Emergency Planning. These data are used to assess the impact of rated business on the national economy.

The next question that arises is how does a contractor obtain ratings to acquire timely deliveries of capital equipment, including production equipment and scientific and technical equipment to be privately owned, primarily needed to produce rated business. The procedure is to file a DOD Form 691 with the nearest Defense Contract Administration Services office. Need for such equipment will be validated by a production representative from that local office and the application will be forwarded by that office to the procurement contracting officers having jurisdiction over the contract or contracts. The procurement contracting officers have delegations, in most instances, to assign a contractor the right to apply a DX or DO rating on his purchase order to obtain such equipment, if it is absolutely necessary to perform DX or DO rated contracts and if similar equipment is not available in his plant.

Now a contractor has reached the point where everything is under way with no problems for the timely deliveries of the items ordered on his rated contracts. Supporting contracts, orders, and ACMO's, as well as those of his suppliers have been placed, accepted and scheduled in accordance with the BDSA rules. These rules require DX- and DO-rated contracts and orders to delay non-rated or commercial orders, if necessary. If conflicts arise between DX- and DO-rated orders, DX orders override DO orders. If conflicts arise in the DX-rated group of orders or the DO-rated group of orders, date of receipt of such orders at the suppliers plant governs. If orders were received, in either the DX or DO groups on the same date, the order with the earliest delivery date is given preference.

As stated, a contractor is now theoretically ready to make timely deliveries under his contracts. However, a change in battle plans necessitates earlier deliveries under his contracts; or he discovers that his forging sup-

plier had a breakdown on his 20,000-pound hammer and his forgings will be three months late; or he finds out that his purchasing agent forgot to order some part necessary to complete the job which has a leadtime of several months; or the steelsheet controlled materials producer is on strike and he does not know when he can ship his order.

For these situations and to legally change the delivery dates established under the BDSA rules and regulations, we have been operating a Special Assistance Program since 1950.

Under this program a contractor may file for special assistance to break temporary bottleneck situations to keep DX- or DO-rated business on schedule or to request aid for timely order placement. A standard BDSA application, known as BDSAF–138, is used by all defense agencies and their contractors. This application is usually filed by the contractor, and again, with the nearest local Defense Contract Administration Services office. The 138 application will be validated by a production representative of that local office and forwarded to certain designated points in Washington, D. C., through the cognizant procurement contracting offices; or other designated offices, such as the Joint Aeronautical Materials Activity, Wright Patterson AFB, Ohio, which has DMS and priorities responsibility for the overall aircraft program, known as the A–1 program.

There are seven DOD offices in the Washington, D. C., area authorized to review these applications, sign and forward them to BDSA. They are:

- Deputy Chief of Staff, Logistics, U. S. Army.
- Army Materiel Command, U. S. Army.
- Office of Chief of Engineers, U. S. Army.
- Naval Material Command.
- Deputy Chief of Staff, Systems and Logistics, U. S. Air Force.
- Defense Supply Agency, Cameron Station, Va.
- Deputy Assistant Secretary of Defense (Materiel Requirements), OASD(I&L).

OASD(I&L) monitors this special assistance program for the entire DOD and related defense agencies. If conflicts occur with other rated orders when the appropriate industry divisions of BDSA check the request with the supplier, the conflicts are referred to OASD(I&L) for resolution. Representatives from the Military Departments or defense agencies involved in the conflict are called in and we try to resolve the conflict by validating need dates, reducing needs to bare minimums, and determining the urgency of the programs involved at that point in time. If the conflict cannot be resolved to the mutual satisfaction of the representatives involved in the conflict, the DOD Master Urgency List is again used, as the last resort, with the conflict being resolved in favor of the program of the higher urgency. Then BDSA, using its priorities powers, directs the supplier to deliver in accordance with the needed delivery date or with a sequence of delivery dates, as the case may be, as recommended by OASD (I & L).

During the past year, the case load has increased substantially for two main reasons: because of the increased military procurement for Southeast Asia and because of the compression of procurement schedules. As a result, production resource difficulties have, and are, being experienced in a number of areas such as forgings, extrusions, electronic components, copper and copper products, machine tools, textiles and clothing items and certain chemicals.

Our experience has shown that as much as an average of two or three weeks can elapse from the submission of a BDSAF–138 application by a contractor until corrective action is taken by BDSA. For urgent Vietnam cases, a short cut procedure was put into effect in August 1965, whereby BDSA will accept telephonic requests from our seven designated Washington offices and action will be initiated immediately. However, such requests must be supported with the submissions of BDSAF–138 applications as soon as possible after such requests are made.

In order to have standard policies, methods and procedures and uniform interpretations of BDSA rules and regulations OASD (I & L) publishes and maintains the DOD Priorities and Allocations Manual, commonly referred to as PAM. This manual is distributed throughout DOD and related defense agencies to field office levels. It is for use in-house only, not because it is classified, but because of its bulkiness and because of its large distribution. Over 10,000 copies are distributed. The Defense Contract Administration Services offices also have standard priorities and allocations instructions, issued as part of their Production Manual. These instructions are based on, and consistent with, those contained in the DOD Priorities and Allocations Manual.

This article has covered DOD procedures related to priorities, the Defense Materials System, the Special Assistance Program, and the use of the DOD Master Urgency List in relation to priorities and the Special Assistance Program. It is hoped that it will be helpful to the readers of the *Defense Industry Bulletin*, especially to those in industry, in understanding the manner in which these closely interrelated systems function. There are important benefits to be gained by DOD, defense related agencies and industry through the proper use of priorities and allocations authorities. Using these authorities and procedures, industry should be able to schedule DX- and DO-rated business to fulfill contract delivery schedules with the minimum disruption to normal commercial business. Since the defense take of the Gross National Products is still less than 10 percent, it is felt that industry can schedule and make timely deliveries of DX- and DO-rated contracts and orders, in most instances, without major disruption to commercial business.

New Anti-Tank Weapon To Be Tested

Test firing of the Army's Medium Range Anti-tank/Assault Weapon System (MAW) will begin next spring on an overland range at Cape Kennedy, Fla.

Weighing 27 pounds, MAW is the Army's answer to the front line soldier's need for a guided missile system light enough to be carried by one man, to be shoulder fired and yet having a warhead big enough to destroy most armor and other infantry targets. MAW will be superior in range, accuracy and lethality to the 90mm recoilless rifle which it replaces.

Developent firings will be conducted by McDonnell Aircraft Corp., MAW prime contractor, under the direction of the Army Missile Command which manages the weapon system at Redstone Arsenal, Ala.

DEPARTMENT OF DEFENSE

Maj. Gen. William A. Enemark, USA, has been designated as Senior Army Member, Military Studies and Liaison Div., Weapons Systems Evaluation Group, Office of the Dir., Defense Research & Engineering.

Dr. Cody W. Wilson has been appointed Dir. of the Behavioral Sciences Office in the Advanced Research Projects Agency, succeeding **Dr. Lee W. Huff.**

Dr. Patrick J. Friel has been appointed Dir., Ballistic Missile Defense, Advanced Research Projects Agency, succeeding **Dr. S. J. Rabinowitz** who has returned to Columbia University.

Dr. Carl Walske has been sworn in as Asst. to the Secretary of Defense (Atomic Energy) and Chairman of the Military Liaison Committee to the Atomic Energy Commission.

Richard C. Steadman has been appointed Dep. Asst. Secretary of Defense for Far Eastern Affairs, Office of Asst. Secretary of Defense (International Security Affairs).

C. A. Fowler was sworn into office Oct. 12 as Dep. Dir., Defense Research & Engineering for Tactical Warfare Programs, succeeding **Dr. Thomas P. Cheatham** who has returned to private business.

Brig. Gen. Hal D. McCown, USA, has been designated as Dir., Ground Munitions Office, Office of Asst. Secretary of Defense (Installations & Logistics).

Capt. Kenith V. Lindstrom, USN, has been designated as Dir., Air Munitions Office, Office of Asst. Secretary of Defense (Installations & Logistics).

Capt Victor A. Dybdal, USN, has been ordered to new duty as Dep. Dir. for Plans, Defense Communications Agency.

The following assignments have been made in the Office of the Asst. Secretary of Defense (Public Affairs): **Robert W. Harvey** reassigned from the Directorate for Defense Information to be Special Asst. for Audio-Visual to the Asst. Secretary; **John C. Kirby** reassigned from Executive Assistant to the Asst. Secretary to be Chief, OSD Div., Directorate for Security Review; **William E. Odom** reassigned from Dir. of Defense Information to be Special Asst. to the Asst. Secretary; **Col. Winant Sidle,** USA, nominated for promotion to brigadier general, reassigned from Special Asst. to the Asst. Secretary to be Dir. for Defense Information; and **Lt. Col. Harry J. Maihafer,** USA, reassigned from Chief, Business Branch, Directorate for Community Relations, to be Executive Officer to the Asst. Secretary.

DEPARTMENT OF THE ARMY

Dr. Russell D. O'Neal has been sworn in as Asst. Secretary of the Army, (Research & Development). He was formerly the Vice President of Aerospace Systems, Bendix Corp.

Col. Lawrence R. Klar and **Col. William C. Neubauer** have assumed new duties with the U.S. Army Strategic Communications Command. Col. Klar is serving as the command's Chief of Staff and Col. Neubauer has been appointed Commanding Officer of continental U. S. operations.

Col. Sterling H. Abernathy has assumed newly assigned duties as Comptroller and Dir. of Programs for the Army Missile Command, Redstone Arsenal, Huntsville, Ala. He succeeds **Col. David Marcelle** who has been transferred to the Office of the Comptroller, Department of the Army.

DEPARTMENT OF THE NAVY

The Navy's David W. Taylor Model Basin, Carderock, Md., is getting a new commanding officer and a new technical director. Capt. **Manuel Vincent** has been reassigned from duty with the U.S. Navy Mission to Brazil to duty as Commanding Officer of the Model Basin. **Dr. Alan Powell** has been appointed to the position of Technical Director. He has served as Head of the Acoustics and Vibration Laboratory since January 1965.

Col. **Howard E. Wertman,** USMC, has reported for duty as Chief of Staff, Marine Corps Supply Activity, Philadelphia, Pa. He comes to the new assignment from duty as Commanding Officer, Third Force Service Regiment, at Okinawa.

DEPARTMENT OF THE AIR FORCE

General Hunter Harris Jr., Commander in Chief, Pacific Air Forces will retire from the Air Force on Jan. 31, 1967.

Maj. Gen. Neil D. Van Sickle has been named Dep. Inspector General for the Air Force.

Brig. Gen. Albert W. Schinz has been reassigned from duty in Vietnam to a new assignment as Commander Air Force Tactical Air Warfare Center, Eglin AFB, Fla.

Beril Edelman, Industry Relations Manager of Western Electric Co., Inc., has been named a consultant to the Dep. Under Secretary of the Air Force (Manpower).

Dr. William B. Simecka, former Navy consultant, has been named Chief Scientist of the Air Force Armament Laboratory, Eglin AFB, Fla.

Col. Robert Muldrow has been appointed Vice Commander, Air Force Missile Development Center, Holloman AFB, N.M., replacing **Col. Lee L. Peterson.** Col. Peterson has been serving in the dual capacity of Vice Commander and Chief of Plans and Requirements since **Col. William Cleveland's** retirement last July.

New assignments in the Air Force Systems Command (AFSC) are:

Arthur G. Wimer Jr., Chief Scientist succeeding **Dr. Bernhard H. Goethert; Brig. Gen. Henry B. Kucheman Jr.,** Vice Commander, Aeronautical Systems Div.; **Col. Robert M. White,** Chief, Tactical Systems Office, Dep. for F–111, Aeronautical Systems Div.; **Col. Spencer S. Hunn,** Dep. for Tactical Systems, Electronics Systems Div.; **Col. Francis J. Dillon Jr.,** Dep. for Surveillance and Control Systems, Electronics Systems Div.; **Col. Charles G. Johnson,** Chief, Tactical Planning Division, Directorate of Planning and Technology, Electronics Systems Div.; **Col. Conrad R. Peterson,** Dir., 458/490L Engineering Div., Electronics Systems Div.; **Col. Ralph A. Newman,** Chief, Resources Support Office, Systems Engineering Group; and **Col. Raymond S. Sleeper,** Commander, Foreign Technology Div.

New assignments in the Air Force Logistics Command are:

Col. Paul E. Greiner relieves **Maj. Gen. C. B. Root** as Commander, Mobile Air Materiel Area, Brookley AFB, Ala.; **Lt. Col. E. Vince Moyer,** Chief, Office of Information, Warner-Robins Air Materiel Area, Robins AFB, Ga.

Radiography Handbook Available

DOD Handbook H–55 titled "Radiography," is now in distribution throughout Government and industry. The publication is the second in a series of non-destructive testing handbooks which were developed by the Army Materiels Research Agency and published by the Office of the Assistant Secretary of Defense (Installations & Logistics).

The handbook provides technical guidance to quality and reliability assurance personnel concerned with non-destructive testing techniques used in the detection of discontinuities and other material defects in metals and non-metallic products.

The document is available for purchase from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for $1.25 a copy.

A common defense market

by
Leonard A. Alne
Dep. for Weapon Systems Planning
Office of Dep. Asst. Secretary (International Logistics Planning)
Office of Asst. Secretary of Defense (International Security Affairs)

It would be fair to acknowledge that the world has not in general queued up to join what Secretary McNamara introduced, in Paris in May 1965, as the Common Defense Market. As a matter of fact, one defense minister is reportedly of the opinion that his substantial orders for U.S. defense equipment have nothing to do with any Common Defense Market.

Perhaps our problem lies in those capital letters. No one has yet established, or promised to establish, a *Common Defense Market* but, like Moliere's character who was astonished to learn he had been speaking prose all his life, we may indeed be well into the establishment of a *common defense market.*

Certainly, a "common defense" has been affirmed by most of the free world—by the terms of the treaties of the North Atlantic Treaty Organization, the Southeast Asia Treaty Organization and the Central Treaty Organization and by repeated subsequent confirmations. But has this identification with a common defense led to a common marketplace for defense equipment? The answer depends on what test you apply. It happens to be yes if one compares free world cross-border defense transactions with those of the European six-country common market (whose existence no one challenges)—both relative to the levels of domestic transactions. In 1964 the six-country exports within the common market amounted to $18.4 billion or about eight percent of the gross domestic product at factor cost of $421 billion in those countries during the same year. These data reflect the success of the common market in that exports within the six countries during the period 1958 to 1964 increased 168 percent.

Now, with respect to cross-border transactions within the free world involving defense hardware, the United States alone, during the four and one-half years after June 30, 1961, has received orders valued at about $6.8 billion (and commitments for another $3.7 billion). During these same years, the defense budgets of the free world countries outside the United States made available about $45 billion for defense hardware. On an order-and-commitment basis, therefore, they ordered from the United States about 25 percent of their defense hardware procurements. United States receipts on these orders were about $6 billion or about 13 percent of the defense hardware budgets of the six countries. Our allies have demonstrated, therefore, a willingness to spend about one dollar in every eight for defense hardware procurements from the United States. During the same period, U.S. defense expenditures abroad total about $12.3 billion (not including expenditures associated with Vietnam) of which about $700 million was for defense equipment—the predominant remainder being for troop deployment costs.

It can be argued, therefore, the $6.7 billion in free world defense hardware cross-border transactions, during a four and one-half year period, constitutes sufficient evidence to permit the assertion that a common defense market does, in fact, exist.

But whatever real progress has been made so far toward a common defense market, what are the prospects for further progress? Any such prediction rests on an amalgam of economic, technical and political realities.

The Economic Argument.

Economically, the case for a common defense market is unshakable. No one can dissent from the thesis that if Country A can build one radar system or two ships with one unit of labor and capital, and Country B can build two radar systems or one ship with one unit of labor and capital, then the two countries, each spending two units of labor and capital, have the choice of:

> **Country A building one radar and two ships, Country B building two radars and one ship, for a total of three radars and three ships;**

or, by cross-servicing one another through trade,

> **Country A building four ships, Country B building four radars, for a total of four radars and four ships.**

The better economic choice is clearly the latter.

It is less obvious, however, that the same result in lesser degree obtains when a country has no natural advantage over another country in any field of defense equipment. Suppose Country C with one unit of labor and capital can produce either 15 radios or one truck and that Country D with a similar unit can produce 10 radios or half a truck. D is disadvantaged in both items but its disadvantage in radios is less. Now, if each country, insisting on self-sufficiency, devotes one unit of labor and capital to radios and two units to trucks, they can produce:

> **Country C, three units, building 15 radios and two trucks; Country D, three units, building 10 radios and one truck, for a total of 25 radios and three trucks.**

However, if each decides to produce that concerning which it has the greatest comparative advantage or least comparative disadvantages, C will produce trucks and D will produce radios:

> **Country C, three units, building three trucks; Country D, three units, building 30 radios, for a total of three trucks and 30 radios.**

With such specialization, C and D have gained five radios. To make trade feasible, they could agree on prices such that one truck is equivalent to 18 radios, in which case:

> **Country C would receive 18 radios and two trucks; Country D would receive 12 radios and one truck.**

There would be gain for C of three radios and for D of two radios relative to their independent ability as given in the first situation above. D, of course, continues disadvantaged in total product relative to C but both countries gain by virtue of their agreement to trade.

The economic moral is clear. The defense technology advantage of the United States is great—not because of intelligence, of course, but because of the breadth of its research and development effort and its relatively longer production runs against which

non-recurring costs can be amortized. But even with such a natural general advantage in the United States, the benefits of specialization and trade accrue to both the United States and a smaller country even when the smaller country finds itself disadvantaged in all fields of defense technology. And such across-the-board disadvantage is at least unusual if it does exist at all.

The Technical Argument.

A single current high-performance tactical aircraft costs today about 120 times as much as the best similar (but hardly equivalent) aircraft of early World War II. Defense technology has indeed become incredibly costly and the ability of even the largest of the free world countries to pay for, let alone produce, the whole arsenal of sophisticated defense is being severely tested. Given the enormous need to devote public resources to non-defense efforts, it has been unavoidable for some time that defense ministers weigh very carefully whether to develop and produce at home those items of defense hardware which can be procured much more economically abroad. This technological cost-effectiveness thrust has been creating a common defense market for the last five years, whether the phrase is a happy one or not, and will continue to do so until the need for defense vanishes.

The Political Argument.

It must be remembered that a common defense market differs from a civil sector common market in that defense procurement comes under the tight control of governments; is closely associated with national security; and is large in value and receives, therefore, careful decision-making analysis. The six countries in Europe recognized these differences by excluding military procurement from the categories of transactions coming under trade liberalization within the community, and it should be generally recognized that a formal Common Defense Market is more ambitious than any similar effort in the civil sector and has not, in fact, been tried.

These differences, characteristic of defense procurement, compel defense ministers to take into account:

- The need, at whatever cost, for establishing and maintaining a defense production base at home for selected items.
- The labor and individual capability for and interest in domestic production.
- The availability of foreign exchange.
- The incremental differences in security, cost and quality between buying at home and buying abroad.
- The political merit and impact of each of the options.
- The priority of actions required to maintain an effective defense force.

One cannot write a scenario for this process of analysis even in the general case. But the process does go on continuously in each government and the results are visible. Defense ministers, by their decisions in the face of economic, technical and political imperatives, are forming a common defense market.

The United States Role.

Candor suggests that the United States now stand up and be counted in regard to its intentions on any common defense market. Very simply, is it willing to buy defense equipment abroad in the light of the same imperatives which it sees confronting its allies?

The answer is yes, but the imperatives need some illumination. Economically, the United States is, by some measure relevant to defense, about twice as large as its allies combined. With a $7 billion annual investment in research and development and with defense production runs averaging an order of magnitude higher than that of any other ally, the scale of U.S. defense procurement brings in train a scope and machinery of management so broad that the competitive entry of a foreign government or firm into the process is not simple to arrange. Nevertheless, it can be done—witness the Canadian success in winning DOD orders averaging over $200 million annually during the last few years, and British success in winning DOD orders in the amount of about $125 million so far under the F–111 arrangement (including a Rolls Royce engine for the USAF A–7 aircraft).

The theory of "least comparative disadvantage" noted above is quite valid but the DOD military procurement officer, charged with a large complex program with tightly scheduled performance dates and burdened with uncompromising users on the one hand and obstreperous laws of physics on the other, is not likely to be much preoccupied with the subtle opportunities presented by economics.

Technically, there is promise. We know that there are fields in which our allies excel—aircraft engines from the UK, signal generators from Germany, anti-tank weapons from France, just to take some examples. We know that every country will continue to bend every effort toward achieving a recognized technical superiority (we would think in selected fields when the whole spectrum of defense technology cannot be covered) and we know that good ideas distribute themselves rather evenly among the human race.

Politically, we have a Buy American Law and an exquisite balance of payments problem. The law dates from 1932 and the Secretary of Defense does not exercise the exceptions provided by it in any casual way. The balance of payments problem is hopefully more short term but, until the world-wide liquidity problem is solved, may remain with us as long as U.S. defense foreign exchange expenditures remain substantial.

Nevertheless, politically, there is a highly significant fact that promises a U.S. willingness to participate in the steady growth of a common defense market. The United States believes it is in its interest, as well as the interests of its allies, to encourage the adoption of rules of the road under which each country can have a chance to realize its technological potential and aspirations and contribute thereby to the common achievement of the common defense. The United States will probably not be willing to move any faster than any other country in expanding off-shore defense hardware procurement. The United States will compete hard and will expect hard competition, but it does want to build and keep the arena in which that competition can take place. And it does want the other teams to be there. Allies, who may doubt this, should challenge the United States, not in terms of generalized debate but in terms of specific arrangements and requirements figuring significantly in the decision-making process of each defense ministry.

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Springfield, Va. 22151

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Military Handbook on Rubber Available

A new handbook titled "Rubber and Rubber-Like Materials," MIL–HDBK–149A, which gives the latest information on rubber materials, is now available to the public.

The handbook is intended mainly as a source of technical information and design data for engineers and designers of military equipment.

Different types of elastomers are included in the booklet, with pertinent information on their resistance to fluids and weathering, physical and electrical properties, design data and suggested applications.

Copies may be obtained from the Naval Supply Depot (DCI), 5801 Tabor Ave., Philadelphia, Pa., 19120.

AFFTC—Keyed to Future Requirements and Today's Needs

By
Maj. Gen. Hugh B. Manson

Leadership today—both industry and military—must be keyed to thinking in terms of far-into-the-future requirements as well as being prepared for sudden change or modification of present-day products and programs.

This concept is an everyday mode of living and operating for those of us at the Air Force Flight Test Center (AFFTC), Edwards AFB, Calif.

Perhaps best illustrative of our concept, of the many test programs currently under way at this huge Mojave Desert installation, is the XB–70A. Originally conceived as a follow-on bomber to replace the B–52, in the decade of its turbulent development from the drawing board in 1955 to its first flight in 1964, the designated use of this unique craft went through a series of changes from bomber to sophisticated surveillance system (RS–70) before its ultimate utilization as a vehicle for conducting research, including supersonic transport (SST) research.

Although practical operation of the SST is not envisioned for several years to come, at least three other test programs presently active at Edwards are directly or indirectly concerned with it. These are the SR–71/F–12 (Air Force-Lockheed), F–111 (Air Force-General Dynamics) and X–15 (Air Force-National Aeronautics and Space Administration-Navy)—all of which have features under study for incorporation into SST design.

During my first tour of duty with AFFTC (1959–60) as its deputy chief of staff for operations, the X–15 rocket plane made its initial powered flight. Shortly thereafter, AFFTC received the first of three X–15's built by North American Aviation and turned it over to the National Aeronautics and Space Administration's (NASA) Flight Research Center at Edwards for the then planned 50-mile and 4,000-miles-per-hour space probe research program.

Since that time this remarkable trio of scientific research craft have made approximately 160 flights during which they have well exceeded the original program goals—setting the current speed record of 4,104 miles per hour with the number one craft in June 1962, and the current unofficial altitude record of 354,200 feet in August 1963 with number three.

Plans now call for programming a speed of Mach 8 and altitudes of over 400,000 feet utilizing the rebuilt number two X–15 (wrecked in a November 1962 crash at Mud Lake, Nev.). It has been modified to carry an additional 13,500 pounds of propellant in external fuel tanks, and is 29 inches longer with a height increase of 19 inches.

In addition to the X–15's specific design mission of obtaining data on hypersonic aerodynamics, problems of reentry heating, physiological and psychological problems, and the effectiveness of reaction controls, future projects programmed through 1967 include: high altitude sky brightness, micrometeorite collection, ultraviolet stellar photography, heat exchanger program, atmospheric density measurements, horizon scanning and definition, advanced integrated data system for future aerospace vehicles, rarefied wake flow experiment, supersonic decelerators, and high temperature leading edges for dissipation of extreme temperature effects.

The millions of bits of data gathered on these flights have had and will have an immeasurable effect upon our manned space program as well as the design and construction of future supersonic vehicles such as the SST–type craft. Tied together with other millions of pieces of data garnered by the XB–70, plus the performance evaluations of the titanium-honeycomb constructed, delta-winged SR–71's and YF–12A's along with the swing-wing F–111, should give our nation's aviation industry a wealth of SST background information enjoyed by no other country in the world.

Maj. Gen. Hugh B. Manson, USAF, is Commander, Air Force Flight Test Center, of the Air Force Systems Command. Prior to this assignment he was Commander of the Systems Engineering Group of AFSC's Research and Technology Div. He is a command pilot with over 4,500 hours flying time.

The unique working relationship at Edwards between AFFTC and the contractor has paid off in a number of fashions with two main advantages heading the list. First, communication between user and builder is greatly simplified—men can sit down together and discuss problems after a five-minute drive rather than after a cross-country trip involving hundreds of dollars of travel monies. Many contractors have extensive facilities on base.

This advantage of physical proximity also allows a first hand "over the shoulder" look at problems and progress as results come in. The resulting ease of cooperation and coordination has been a great time saver.

The first Minuteman silo launch is a good example. At the start of my initial tenure at Edwards a tethered full-scale Minuteman solid propellant missile was successfully fired from a silo here by the Directorate of Rocket Propulsion and Missiles—now the Air Force Rocket Propulsion Laboratory. Boeing and Air Force personnel were working together at the same place at the same time with a common goal. It was a team effort.

Less than nine months later, the eighth of 18 scheduled full-scale Minuteman firings by The Boeing Co. became the final firing due to the program's success. Today, the Strategic Air Command has Minuteman I missiles on alert in underground launchers in five midwest states. Installation is also under way for improved Minuteman II missiles in one of these states and in one ad-

ditional state. Minuteman II will begin to replace Minuteman I this year.

Another very highly successful test program in this line, which amply illustrates the thesis of thinking ahead and being prepared to modify program goals due to an unusual situation, was that of the Lockheed C–141 aircraft Category II testing.

Originally, one of the main mission objectives for the C–141 Joint Test Force called for approximately 1,000 hours flying time on one of the test aircraft during the 12-month period (1964–65) scheduled for the overall test program. This was estimated to be the equivalent of about two years normal flying time for a Military Air Transport Service (now Military Airlift Command—MAC) transport aircraft, which was to be the prime user of the C–141.

However, far exceeding all anticipated expectations, this C–141, flying out of Edwards, logged its initial 1,000 hours in just six months. The joint test force then promptly upped its overall test program goal to 1,800 hours. Relatively trouble-free operation allowed flying up to 15 hours a day—three times normal MAC utilization. On one occasion it remained aloft over 18 hours unrefueled and later made a 6,535-mile non-stop flight. This caused the test force to shoot for a 2,000, then 2,400 and, finally, an unheard of 2,500 hours on this airplane for the 12-month period ending in June 1965. The goal was actually achieved in a little over 11 months. This is a fine tribute to the smooth functioning of the close-knit Air Force, Lockheed, subcontractor, vendor and Army liaison personnel which comprised the C–141 Joint Test Force.

Although less than 30 days after becoming operational in August 1965, the C–141 was providing the big muscle for MAC's airlift strength with daily flights to Vietnam transporting cargo and troops to Southeast Asia and bringing back wounded, there had long been an obvious need to develop an even newer, larger, long-range cargo aircraft to replace the aging C–124's and C–133's. Before the first prototype of the C–141 rolled off the assembly line in the spring of 1964, a study project was well under way at DOD and U. S. Air Force headquarters tabbed Cargo Experimental-Heavy Logistics System (CX–HLS), for the development and procurement of this new jet transport aircraft.

This aircraft was later designated the C–5A and, on Dec. 31, 1964, project definition phase contracts were awarded by DOD to Boeing, Lockheed and Douglas for the airframe, and to General Electric and Pratt and Whitney for the engine competition. On Sept. 30, 1965, it was announced that Lockheed had been selected to develop and produce the aircraft with General Electric as manufacturer of the C–5A's 40,000-pound-thrust fan jet engines.

The C–5A is being purchased under a new contracting concept known as "total package" procurement. Under this concept, one contract is awarded for development, production and support of the aircraft, including spare parts and ground equipment. This differs from previous procurement programs wherein one contract was awarded for development work and another for production. Under the total package concept, the aircraft manufacturer is responsible for total performance of the aircraft as an integrated system.

Construction of C–5A test facilities at Edwards is expected to get under way in April 1967, and the target date for our first test aircraft is October 1968. It will become operational in 1969.

An area of research at Edwards in which we have been vitally interested for more than a decade has been that of the V/TOL (Vertical Take-Off and Landing) aircraft. Currently under test are the U. S. Army XV–5A lift-fan research plane and the tri-Service XC–142A tilt-wing transport—both of which appear to have great potential.

Although each has the capability of taking off and landing vertically in an area slightly larger than that of a tennis court, they employ totally different design techniques and principles. Both aircraft are the result of a combined effort on the part of several different aircraft and engine companies.

The Ryan Aeronautical Co. XV–5A, powered by two General Electric J–85 jet engines, embodies the lift-fan principle to accomplish its V/STOL (Vertical/Short Take-Off and Landing). This consists of three fans—two five-foot diameter lift fans, one in each wing, to provide lift for vertical take-off and landing, and a smaller nose fan used to provide lift, pitch trim and control—which function through a combination of positioning inlet and exit louver doors above and below the fans. Valves divert the main jet exhaust flow to power the fans for vertical flight. For forward flight, the diverter valves close off ex-

The X–15 research vehicle, which has been designed to probe the fringes of space, is released from its B–52 mother ship.

haust gases to the fans and allow operation as a conventional jet aircraft.

Two of these aircraft were built, with the first conventional flight in May 1964, and first hovering flights in July of that same year. Although one was lost in April 1965, the program is progressing.

A pioneer in the area of V/TOL, this is not Ryan Aeronautical's first effort in the field. Back in the fall of 1955 Ryan brought to Edwards a sleek, delta-winged craft called the X–13 Vertijet which was destined to become the world's first jet V/TOL aircraft. The design, fabrication and testing of the X–13 was an Air Force program, but behind it stood nearly 10 years of Ryan-Navy research sponsored by the U. S. Navy.

Ling-Temco-Vought, Inc., supported by Ryan and Hiller aircraft companies, developed and built the XC–142A. It is the world's largest V/STOL aircraft and the first developed by this nation for operational evaluation rather than the testing of a concept. A combined program of the Air Force, Army and Navy, it is also the nation's first of three tri-Service V/STOL aircraft programs.

The XC–142A is a four-engine, turboprop, high-wing transport airplane which uses the tilt-wing, deflected slipstream concept to achieve V/STOL operation. It is powered by four General Electric T–64–GE–1 turboshaft engines which drive four Hamilton Standard lightweight fiberglass propellers, each 15.6 feet in diameter, plus an eight-foot tail rotor and accessory equipment. All four engines are linked together by a unique interconnected drive shaft system so that even a single engine can turn over all four propellers and the tail propeller.

Part of a system designed for swift transport of combat troops, equipment and supplies from assault ships or airfields into unprepared areas under all-weather conditions, it is capable of speeds that belie its squared-off appearance. The airplane will be able to take off and land vertically in all types of terrain and achieve a top speed of more than 430 miles per hour in level flight.

Five XC–142A aircraft were constructed under the DOD contract awarded to Ling-Temco-Vought. Two of these aircraft were delivered to the Tri-Service V/STOL Test Force at Edwards during the summer of 1965, two additional ones in April 1966, and the last one in May 1966. More than 250 flights and 225 flight hours have been accomplished to date with some 25 pilots, including 15 military, having flown the aircraft.

The huge number of helicopters and the vast extensiveness of their operations in Southeast Asia have contributed a great deal to the tremendous potentiality of these V/STOL-type aircraft and their impact on the future of aviation.

Just as Southeast Asia helicopter actions have intensified the development of the V/STOL program, so have other applications of the unique type of jungle war practiced in this theater caused the Air Force Systems Command and AFFTC to take a second look at the Air Force aircraft inventory—past and present—as well as that of our sister Services, the Navy and Army, for solutions to some of the problems.

Accustomed to dealing in the terms of more sophisticated Mach 2 and Mach 3 aircraft, we have had to readjust our thinking to the era of the subsonic. Supersonic fighters and fighter bombers, on low level missions, are hindered by their speed in proper target identification. They also have limited "time on station" or loiter capability and are unable to throttle back sufficiently for helicopter escort.

These factors proved that, contrary to popular thinking, the era of the World War II propeller-driven aircraft was not ended, but needed to be revitalized. Dipping back into World War II stocks, we brought out of retirement one of the hottest twin-engine bombers of its day—the B–26 Invader—which was modified by the addition of a bigger and stronger wing plus more powerful engines for the operations envisioned. After modification the aircraft underwent Category II testing at Edwards during 1964–65 and is now on operational duty with the 1st Air Commando Wing at Hurlburt Field, Fla., as the B–26K.

Another doughty warrior of World War II fame, which has proven to be an excellent all-purpose aircraft in the field in Vietnam, is the Douglas A–1E Skyraider, a propeller-driven, single-engine fighter/fighter bomber which was obtained from the Navy. Now under consideration as a follow-on jet replacement for the A–1E is the Navy's subsonic A–7A Corsair II, a light ground-attack aircraft developed by Ling-Tempo-Vought to meet the specific requirements for attack

The B–26K, a modified and modernized World War II B–26, is a light bombardment aircraft designed for use in support of Air Force counterinsurgency operations.

and close support warfare. We expect to have this aircraft for Category II testing at AFFTC.

As an outgrowth of Southeast Asia effort, the U. S. Army Aviation Test Activity at Edwards will begin two tests sometime this fall. The first is the armed fighter-configured version of the Bell UH–1 helicopter, named the Huey Cobra. The second will be the armored "gun-platform" version of the Boeing-Vertol CH–47 in various weapons combinations of from seven to 10 guns or cannons plus grenade and rocket launchers.

From the foregoing examples of AFFTC test and support activities, it is clear that the center satisfies more than just the needs of the Air Force Systems Command. Our facilities are utilized to some degree by NASA, Army, Navy, Air Force operational commands, contractors and friendly governments. In this latter category, test work has been done for and by the German and Norwegian governments. At present we have under way testing of the Northrop-Norair CF–5A by the Royal Canadian Air Force and in the future AFFTC will support the F–4K (British) tests by McDonnell Aircraft for the Air Force and Great Britain.

Assistance to the commercial aviation industry is also of vital concern to us and practically every major U. S. jet airliner flying today has tested its wings in some aspect at Edwards facilities. Currently under way is a year-long test program by Douglas Aircraft of the new elongated DC–8 Super 61. These tests of purely commercial products are conducted on a non-interference basis and all costs incurred are reimbursable.

What does the future hold in store for the AFFTC? Aside from the SST, major test programs now in the planning stage include the AMSA (Advanced Manned Strategic Aircraft), B–111A, V/STOL strike-reconnaissance fighter, advanced V/STOL fighter, advanced V/STOL light transport (CV–X), V/STOL intratheater transport (CV–6) and the manned hypersonic vehicle.

With regard to the latter, preliminary tests already are under way by NASA and the Air Force at Edwards with lifting bodies (M2–F2 and HLS–10). In addition our telemetry and tracking facilities are now tied in with, or will be tied in with, the Air Force Western Test Range and the Navy Pacific Missile Range and in the easterly direction to facilities located at Wendover, Utah. The Edwards area represents one site for land recovery of space vehicles, especially when the western hemisphere's largest natural landing area is added —Rogers Dry Lake, 29,632 acres or 46.3 square miles. Summed up, we like to think of the Air Force Flight Test Center and Edwards AFB as having this potential to contribute to the nation's space effort.

High-Speed Computer Printouts Under Study

Precise control of a laser's intense coherent light to position a beam to any of 131,072 points, within a space smaller than a match head and at speeds exceeding 100,000 selections per second, is under Army study for high-speed computer printouts.

Now in exploratory development at the U.S. Army Electronics Command (ECOM), Fort Monmouth, N.J., the experimental equipment was produced under contract by the Systems Development Division of International Business Machine Corp.

Considering its potential to store data, provide printed readouts and project images, ECOM scientists envision a system in which such inputs as typed material, charts and line drawings could be fed into a computer. Relayed hundreds of miles by radio to another computer, they could be processed and reproduced instantly as printed pages or as greatly enlarged screen displays.

ECOM's experiments with the equipment are being carried out by the Display Techniques Team of the Communications and Automatic Data Processing Laboratory headed by Colonel George M. Snead Jr. Pierce Siglin is the team leader and Erich F. Kral is project engineer.

New Landing Mats Tested by Military

Tri-Service testing of a new landing mat for use in construction of military airfields is now being conducted at Dyess AFB, Abilene, Tex.

Tests will include airfield construction, landing and takeoffs by a variety of military aircraft, and recovery and disposition of materials on conclusion of the tests.

Four types of metal landing mats will be installed at the test site—three made of extruded aluminum and one of a new lightweight aluminum honeycomb.

Headquarters, U.S. Air Force, is DOD executive agent for the test project.

Special Fuze Developed for Explosive Anchor

The U. S. Army has designed and fabricated a safe, reliable fuze mechanism for use with the new explosive embedment anchor being developed at the U. S. Army Mobility Equipment Center's Engineer Research & Development Laboratories, Fort Belvoir, Va.

The new fuze, which will be used to set off the propellant charge driving the anchor into the ocean floor, incorporates several special features.

Because of its underwater use, the fuze's electric components are incapsulated in a rubber potting compound to prevent failure from water leakage. In addition, circuitry is designed so that the fuze will not arm itself until it is at least 27 feet below the water surface.

Another circuitry design feature shunts the detonators to prevent premature firing before the instant of impact. As additional safety features, the fuze will disarm itself if for any reason it is brought to the surface before the propellant is ignited or will deactivate itself completely in the event of a misfire by draining both the battery and firing capacitor in about 40 minutes.

The explosive embedment anchor is being developed as a mooring component and will replace the massive weight of ground tackle required in a conventional mooring point.

Weighing 4,600 pounds, the experiment anchor can do the job of conventional ground tackle weighing about 33 tons. Incorporated in a multileg mooring system, it will permit safe mooring of tankers of up to 40,000 dead weight tons.

MTMTS Operations Booklet Available

"Military Traffic Management and Terminal Service—An Instrument of National Policy," an illustrated 32-page booklet which describes the responsibilities, organizational structure and operational procedures of Military Traffic Management and Terminal Service (MTMTS), is available to the public.

Produced by the MTMTS Office of Information, the publication stresses the fact that one of the most important ingredients in the field of logistics is transportation.

MTMTS was organized two years ago and directs, controls and manages the movement of all military traffic in the United States.

Copies of the booklet can be obtained by writing to Commander, Military Traffic Management and Terminal Service, Washington, D.C. 20315.

Civilian Reserve Ready for Emergency

Three times in this century alone, emergencies demanded expansion of the Government's civilian staff. Each emergency has led to a desperate search for executive talent to staff improvised organizations. Each time, fortunately, the Government eventually was able to report its mission accomplished.

It has become clear, however, that no emergency exactly duplicates its predecessor. We all know that an emergency wholly without precedent can befall us. Hard reality tells us that waiting until disaster strikes amounts almost to an invitation to disaster. Waiting for a crisis to come is no longer acceptable.

To meet this challenge, the Executive Branch and Congress created the National Defense Executive Reserve.

The Executive Reserve is a landmark in the stream of Government history. In the past, many agencies acted individually to prepare for an emergency, but no Government-wide coordination, geared to common standards and objectives, was ever before attempted.

In 1955 the Congress enacted an amendment to the Defense Production Act of 1950 authorizing the President to establish the National Defense Executive Reserve and train its members. In 1956, under the authority of Executive Order 10660, the Federal Government began to build an organization unique in American history. Today this pool of trained civilian reservists is one more vital component of national strength in emergencies.

The Office of Emergency Planning (OEP), which coordinates in behalf of the President the broad field of emergency mobilization, coordinates the activity of the National Defense Executive Reserve. Its current authority is derived from Executive Order 11179, issued on Sept. 22, 1964.

Departments and agencies with mobilization responsibilities enroll reservists from business, labor, argiculture and the academic professions. The professional status of the members of the Executive Reserve is as follows:

Industrial Leaders:	
Firms with more than 500 employees:	49%
Firms with less than 500 employees:	28%
Federal Government Officials:	1%
State and Local Officials:	3%
Labor, Trade and Professional Society Leaders:	5%
Educators:	3%
Retired:	5%
Other:	6%

There are currently almost 4,000 members of the Executive Reserve. Most of these members are assigned as follows:

Department of Commerce	1,917
Department of Defense	93
Department of the Interior	240
Department of Labor	106
Federal Communications Commission	17
Department of Housing and Urban Development	39
Interstate Commerce Commission	759
Office of Emergency Planning	250

The Department of Agriculture is currently recruiting members for the Executive Reserve.

Criteria for Membership in the Executive Reserve.

Candidates are selected and appointed by heads of departments or agencies, with the concurrence of the Director, Office of Emergency Planning, to assist in carrying out emergency responsibilities. Generally candidates for membership are recruited by individual units or suggested by business, professional, or labor sources. Those selected are people of executive ability in specific areas.

Candidates must be fully cleared for security by the Government before they become reservists.

The reservist and his employer must sign a statement of understanding indicating the reservists may attend peacetime training sessions and, in the event of a national emergency, be available for immediate Federal employment in the area of his training. Reservists are expected to meet from time to time with their program directors or regional directors in order to keep abreast of program developments. Informational and training material usually require short reading time. (The training sessions are generally limited to two days each year.)

Reservists receive a certificate of membership in the National Defense Executive Reserve, and a letter from the head of the agency designating them as a member of a specific unit. Also, appropriate identification and assignment documents are issued to each reservist to facilitate his entrance on duty in an emergency.

The reserve unit will furnish each member specific instructions as to where to report and the nature of his responsibility in an emergency.

Reservists are trained both for general emergency work and, to some extent, for specialized experience or knowledge, but the Government may use him where he is most needed. The training program is planned to avoid undue demands on the reservist's time. Regional training conferences are held not more than twice a year and a national training conference is normally held every three years. Training involves:

- Participation in test exercises and alerts to the extent practicable.
- Attendance at periodic meetings in which mobilization programs are discussed in general.
- Personal consultation on specific mobilization problems relative to his area of competence.
- Reading of publications and other communications pertaining to plans and program—usually specifically related to the reservist's emergency responsibilities.

The reservist receives no pay for his pre-emergency training activities. When called to duty in an emergency, he will become a Federal employee and will usually serve on a salary basis under pay schedules then in effect. If circumstances require him to serve without compensation, he will be allowed to do so, providing appropriate legal authority then exists.

Obligations of members of the military ready reserve normally would bar a candidate's designation as an Executive Reservist.

With respect to training activities, Executive Reservists who are not officers or employees of the Executive Branch of the U. S. Government are exempt from the operation of sections 203, 205, 207, 208 and 209 of Title 18, U. S. Code. Executive Reservist training within the meaning of this

(Continued on Page 41)

SPEAKERS CALENDAR

DEPARTMENT OF DEFENSE

Maj. Gen. J. B. Bestic, USAF, Dep. Dir. for National Military Command System Technical Support, Defense Communications Agency, at Information System Science and Technology Congress, L. G. Hanscom Field, Mass., Nov. 23.

Mr. B. B. Lynn, Dep. Dir., Defense Contract Audit Agency, at the New York State Society of Certified Public Accountants Meeting, New York, N.Y., Nov. 30.

DEPARTMENT OF THE ARMY

Lt. Gen. Austin W. Betts, Chief of Research and Development, at Annual NIKE-X Management Conference, Burlington, N.C., Nov. 28–30.

DEPARTMENT OF THE NAVY

RAdm. Henry L. Miller, Chief of Information, at Navy League, San Antonio, Tex., Nov. 23; at Pearl Harbor Day Luncheon, Philadelphia, Pa., Dec. 7.

Adm. David L. McDonald, Chief of Naval Operations, at Armed Forces Staff Meeting, Norfolk, Va., Dec. 1; at Naval War College, Newport, R.I., Dec. 13; at Naval Academy Dinner, New York City, N.Y., March 7.

RAdm. R. Whitaker, Commanding Officer, Military Sea Transportation Service, at Navy League, Newark, N.J., Dec. 1.

DEPARTMENT OF THE AIR FORCE

Brig. Gen. L. A. Kiley, Commander, Air Force Missile Development Center, Holloman AFB, N.M., at Engineers & Scientists Meeting, Tucson, Ariz., Nov. 22.

Gen. J. P. McConnell, Chief of Staff, USAF, at Houston Forum, Houston, Tex., Nov. 29.

Hon. Robert H. Charles, Asst. Secretary of the Air Force (Installations and Logistics), at American Institute of Aeronautics and Astronautics Meeting, Boston, Mass., Nov. 29-Dec. 1; at Armed Forces Management Assn. Meeting, Dayton, Ohio, Dec. 16.

Brig. Gen. J. S. Bleymaier, Commander, Air Force Western Test Range, at American Institute of Aeronautics and Astronautics Meeting, Boston, Mass., Nov. 29-Dec. 1.

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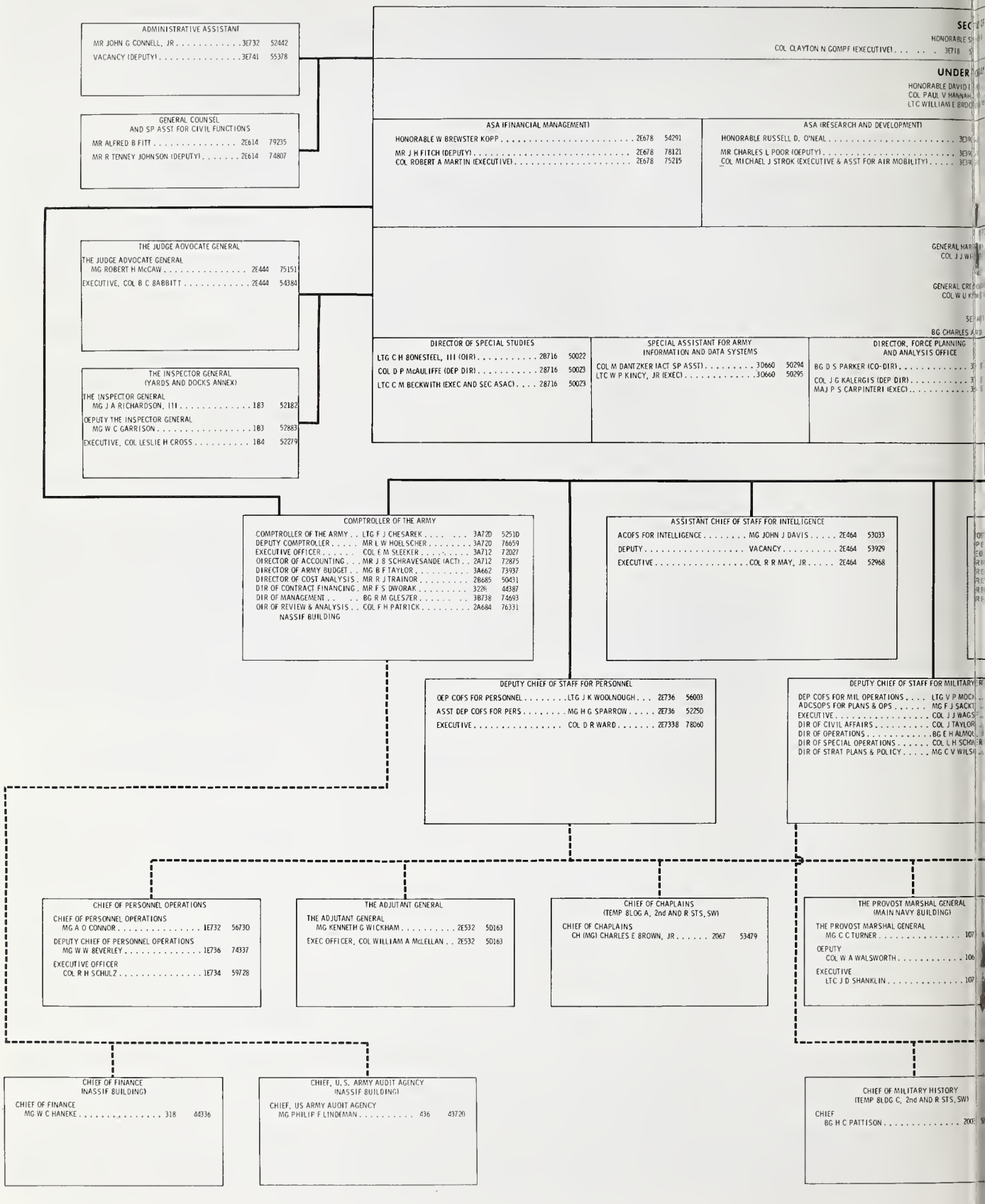
ICBM Reutilization Program To End

The largest disposal program undertaken by DOD since World War II, the Air Force's one-billion-dollar ICBM reutilization and disposal program, involving the deactivation and phaseout of first generation missiles, is scheduled to end soon.

The reutilization program affected 99 Atlas sites, 18 Titan I complexes, 153 launchers and 221 missiles, counting ICBM's on operational launchers, spares with operational units and missiles in storage and still at manufacturers' plants.

Re-use of missile equipment located at deactivated Atlas E and F and Titan I complexes has saved the Air Force over $900 million.

Executive management for the entire program was performed by Headquarters, Air Force Logistics Command, and the San Bernardino Air Materiel Area, Norton AFB, Calif.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MEETINGS AND SYMPOSIA

DECEMBER

15th Annual **Wire & Cable Symposium**, Dec. 7–9, at Atlantic City, N.J. Sponsor: Army Electronics Command. Contact: Milton Tenzer, Electronic Parts and Materials Div., Electronics Components Laboratory, Army Electronics Command, Fort Monmouth, N.J. 07703. (Area Code 201) 535–1834.

Fourth Symposium on **Unconventional Inertial Sensors**, Dec. 6–7, at the Department of State Auditorium, Washington, D.C. Sponsors: Naval Air Systems/Ordnance Systems Commands; Research & Technology Div., (AFSC), and the Institute of Navigation. Contact: Capt. Ross E. Freeman, USN (Ret.), Executive Dir., Institute of Navigation, Suite 912, 711 14th St., N.W., Washington, D.C. 20005. (Area Code 202) 783–3296.

American Ordnance Assn. Symposium on the **Fabrication and Utilization of Lightweight Armor**, (Classified), Dec. 13–14, at the Army Tank Automotive Center, Warren, Mich. Sponsor: American Ordnance Assn. Contact: Director for Advisory Service, American Ordnance Assn., Transportation Building, Washington, D.C. 20006.

First **Nuclear Criticality Safety** National Topical Meeting, Dec. 13–15, at Las Vegas, Nev. Sponsors: American Nuclear Society and organizations and contractors of the Atomic Energy Commission, NASA and the Air Force. Contact: A. J. Smith, Nuclear Reactor Safety Group (WLAS-1), Air Force Weapons Laboratory, Kirtland AFB, N.M. 87117.

JANUARY

Symposium on **Circuit Design by Computer**, Jan. 30–31, at New York University, Bronx, N.Y. Sponsor: Office of Naval Research. Contact: Cdr. D. D. Kilpatrick, USN, Office of Naval Research, Department of the Navy, Washington, D.C. 20360. (Area Code 202), OXford 6–3082.

MARCH

Symposium on **Modern Optics**, seventeenth in a series of international symposia organized by Microwave Research Institute, March 28–30, at New York City. Sponsors: Air Force Office of Scientific Research, Office of Naval Research and Army Research Office. Contact: Lt. Col. E. P. Gaines Jr., (SREE), Air Force Office of Scientific Research, Tempo D, 4th and Independence Ave., S.W., Washington, D.C. 20333. (Area Code 202) OXford 6–3671.

Defense Electronic Supply Center Strives for Reliability and Economy

Engineers of the Directorate of Engineering Standardization, Defense Electronics Supply Center (DESC), Dayton, Ohio, are in the process of consolidating specifications covering parts for various weapon systems. The group, which is spearheading a drive to show that reliability can be economical, expects that the plan will ultimately save the Military Services and DESC a sizeable sum without endangering reliability standards.

Established reliability specifications cover many of the technical requirements for parts used in the Minuteman missile and the F-111 aircraft. DESC engineers, however, are meeting with military and industrial representatives to resolve differences in specification requirements so that DESC-managed specifications will become the single controlling document.

The established reliability specifications differ from the conventional specifications, calling for more stringent quality control and testing requirements which provide evidence of reliability. General specifications cover basic requirements for parts such as a fixed-film resistor. To cover the varying characteristics of film resistors such as their overall length or diameter, specification sheets are attached to describe the item.

In terms of economy for electronic parts, the consolidation of specifications and specification sheets are expected to have a major impact on the Defense pocketbook. By merging two or three sheets from several specifications into one, there would only be one part to stock instead of two or three. Logistics-wise there would only be one stock number to manage.

Also when the need for the extra specification is removed, the need to maintain the general specifications also disappears. The specification writer's job is made easier when only one specification must be revised.

The major objective of the consolidated specification effort is to increase the quantities that can be procured under one specification. According to the economic laws of procurement, larger quantities result in lower prices. Consequently, the buyer who previously purchased 200 resistors under one specification and 300 under another could obtain 500 at a reduced unit price under the consolidated concept.

Industrial sources have also indicated that the effort will have a significant impact on production operations. In-house documentation will be reduced since firms were required to keep separate process specifications and documents for each military specification. Another significant change is the reduction in the amount of testing required. Since each specification requires the same tests, the reduction of one would result in reducing the number of sample units to be tested by one-half. Consolidation of three specifications, therefore, would reduce the number of sample units by two-thirds.

DESC officials also cited the possibility of increased competition on procurements under the consolidated specifications. A contractor would not be required to qualify for the requirements of several specifications where duplicates exist. In other words, qualifying under one specification could make him eligible for bidding on several other parts.

The program is concentrating on resistors, capacitors and semi-conductors since these are more commonly used by the Military Departments and readily lend themselves to standardization. Documents for insulated fixed-film resistors are currenty undergoing coordination in the field. Two others—a solid-electrolyte fixed capacitor and another type of fixed-film resistor—are being readied for coordination. At least six specifications have been identified for review and the directorate is hopeful that the projects can be completed before the end of 1966 or early in 1967.

FROM THE SPEAKERS ROSTRUM

Address by Hon. Paul R. Ignatius, Asst. Secretary of Defense (Installations & Logistics), at the Annual Luncheon of the National Security Industrial Assn., Washington, D. C., Oct. 6, 1966.

Hon. Paul R. Ignatius

Logistical Support in Southeast Asia

I would like to discuss with you the logistical support of our military operations in Southeast Asia. Ensuring that our forces there have the resources they need to carry out their missions is the number one responsibility of the materiel secretaries and the logistics chiefs today, and it is also a principal concern of many of the companies represented here. There have been many problems as well as accomplishments, and I will touch on both. We have asked a great deal this past year from defense industry as well as our military logisticians. Both have responded in a magnificent manner. Indeed, General Victor M. Krulak, Commander of the Fleet Marine Forces, Pacific, stated after a visit to Vietnam earlier this year that the supply situation in Vietnam "is generally better in this war than in any war in the modern era."

Transportation.

First, I would like to review several highlights in the field of transportation. There is a saying in the transportation field that "nothing happens until a move is made." Transportation is the link between production and consumption—the means by which we deliver what you make to the troops who use it.

It is one thing to move supplies through a system where facilities are well established; it is quite another where facilities are virtually nonexistent. There was in South Vietnam, as late as a year ago, only one deep water port—Saigon. There were neither roads nor railroads available to us to move supplies from that port to our forces up-country. Yet in the first six months after our major deployments began, 200,000 troops were moved into the country and supplied with the thousands of items needed for combat operations and their health and welfare.

Airfields and port complexes now exist where before there were only sand dunes and rice paddies. The port of Cam Ranh Bay is a good example. There, on an undeveloped beach, we are constructing one of the largest deep water ports in Southeast Asia. Other ports have been constructed or improved all along the coast. In the last year the port capacity in South Vietnam as a whole was increased by more than 300 percent, and additional capacity is now under construction.

The importance of this increase in port capacity can be illustrated by just a few figures. In mid-year 1965, 176,000 measurement tons were being shipped by sea each month from the United States to South Vietnam. In August 1966 over 600,000 tons were shipped. One year ago, the total military cargo discharged through Vietnam ports averaged 12,500 measurement tons per day. Today the average is 40,000 measurement tons. The deep water ports now in operation at strategic points along the coastline are easing the pressure on the port of Saigon.

To meet daily consumption needs as well as to build up theatre stock levels, it has been necessary to increase our sea and airlift capability. In August 1965 the Military Sea Transportation Service operated or controlled 299 ships. This number was raised to 459 ships by August 1966. In addition to these controlled ships, space is also used on regularly scheduled commercial ships which carry less than shipload lots of military supplies. Additional ships are now being reactivated from the National Defense Reserve Fleet and will soon be in operation to provide still more capacity.

We have also increased the number of aircraft operated or controlled by the Military Airlift Command. Missions flown to South Vietnam increased from 550 in August 1965 to 900 in August 1966. During this period, tonnages shipped by air have tripled.

A logistics pipeline of this magnitude extending over a distance of some 10,000 miles involves a host of interrelated factors, all of which must be brought into play in their proper time and place. Production, transportation, handling, storage and, ultimately, receipt on the far shores for onward distribution to combat units must each be related to the other as well as to the facilities all along the pipeline. Obstructions at any point produce a chain reaction that affects the efficiency of the entire system. For example, the inability to handle cargo in the overseas ports results in holding large numbers of loaded ships awaiting discharge. This, in turn, reduces the total shipping capability and, thus, clogs the pipeline on this end. More importantly, the resulting congestion could prevent the more essential supplies from getting through.

While some problems remain, we have come a long way since November 1965 when port congestion reached a peak with 122 ships awaiting discharge in Vietnamese waters. As someone observed at the time, if nothing else these 122 ships proved that ten ports in the United States could load ships faster than one port in Vietnam could unload them. Today, with the port development that has already taken place, together with improved shipping practices, about 60 ships with military cargoes are in

Vietnam ports, which is just about normal for the tonnage involved.

The lessons of the last 12 to 15 months have emphasized the need for further research in the field of materials distribution and handling. We need to take more of a "systems" approach to the movement of materiel, identifying and properly allocating the many types of costs involved so as to make sound equipment decisions. In addition to looking at the problem from the wholesale supply level, we need to place greater emphasis on materials handling and movement in tactical units. Undoubtedly many of you here are interested in problems of this kind.

To shorten reaction time and to increase the responsiveness of logistics activities in the support of operating forces, whether it be in the form of supplies or service, remains a primary objective of the logistician. The Redball Express operation to Vietnam is a good illustration of the quick reaction concept. During World War II there was a time when the allied advance through France was threatened because the bomb-damaged railroads couldn't handle the volume of supplies moving to the front line. The response to that threat was the use of a huge fleet of trucks whose Redball markings became a symbol for the high priority, essential supplies they carried directly to the front as fast as the trucks could roll.

Today we have a new Redball Express. This time the roads are airlanes stretching from Travis AFB in California to Ton Son Nhut Airfield in Vietnam. The carriers for today's Redball Express are primarily four-engine jet aircraft traveling at 400 to 600 miles per hour.

The Redball Express keeps helicopters, tanks, LARC's, bulldozers, trucks and other major equipments off deadline and ready to go in spite of the rough and intensive use they encounter. The system is designed to deliver the required repair part to the mechanic who needs it within 168 hours (seven days) after he calls for it. Since the Redball Express was established in December 1965, more than 13 million pounds of high priority cargo have been airlifted to Saigon.

Construction.

Port development was only a part of the overall construction task that faced us in South Vietnam—a task that had to be accomplished within the constraints imposed by the extreme heat, the high humidity, the monsoon seasons, and the interdiction of the highway and railroad systems by the Viet Cong.

In addition to the 10 major ports with 25 deep water berths, the construction program includes four major logistic depots, 24 airfields of all types, brigade or equivalent contonments at 40 different locations, 12 bases for coastal patrol and river patrol activities, plus all of the other facilities required for military operations such as troop housing, messing and service, supply and maintenance, petroleum distribution, warehousing, communications, administration, hospitals, utilities, and even roads and bridges.

Programs for out-of-country support of Vietnam include airfields, logistical bases, hospitals and other support facilities throughout the Western Pacific as well as training bases and support facilities in the United States.

Before U.S. combat troops were deployed to Vietnam, one major contractor—the joint venture of Raymond International and Morrison and Knudsen (RMK)—was doing a limited amount of work in the country. In May 1965, the contractor was directed to increase his rate of work-in-place from two million dollars per month to $25 million per month. This was later increased to $40 million per month—a rate now being achieved. To meet the demands of the greatly enlarged effort, two additional firms were brought into the joint venture.

The contractor's work force was increased to some 51,000 people, including 4,200 U.S. citizens, 5,800 third country nationals (mainly Koreans and Filipinos) and 41,000 Vietnamese. To add to the difficulties, skilled laborers were in extremely short supply and training facilities were non-existent. Thus it was necessary for the contractor to import the essential hard core of needed skilled workers, and teach the rest the basic elements of a skill or trade. The skills the Vietnamese have learned as a result of the construction program will be of lasting value to the country.

In this connection, it is important to note that the struggle in Vietnam involves much more than military operations. Equally important are the comprehensive social and economic programs. These programs require significant logistics support involving a wide range of commodities and a complete distribution system. DOD works closely with the Agency for International Development (AID) in order to maintain the right balance between military and economic program priorities and to ensure the maximum utilization of the limited distribution system facilities available. As one example of this cooperation, AID cargo is now entering the military pipeline in the United States and moving under military control to its destination in Vietnam.

Material Support.

Having briefly covered the transportation system and the supporting base structure, I would now like to comment on the material which is flowing through this pipeline.

Winston Churchill's rule of thumb for wartime expansion may provide one index of the effectiveness of our logistical effort. "For the first year or so you get nothing, in the next year a trickle, in the third year a flood." In the case of Vietnam, in only a year or so we are approaching a tidal wave.

The acid test of any logistics system is the ability of our forces to take the field and engage in combat. That ability has been demonstrated in full measure in Vietnam. The performance of the Miitary Services led Charles Burke, in *Fortune Magazine*, to conclude that probably no comparable war has ever been mounted as swiftly and as efficiently.

In FY 1966 military contract awards reached a total of $38.2 billion. This is the largest military procurement program since 1952 and almost $10 billion more than in FY 1965. The increase, of course, is attributable to Vietnam, and the requirements of the war dictate the mix of procurement.

Some 15 percent of the materiel tonnage flowing to Vietnam is ammunition. The air munitions pipeline, for example, contains 120,000 tons. In addition, we have over 130,000 tons of air munitions stocked in Southeast Asia. Since June we have been producing more air munitions than we have been consuming; thus we are not only meeting current expenditures but also replenishing our stockpiles. The monthly expenditure rate, as you know, is very high,

amounting to over two and one-half times the average monthly expenditure rate of the Korean War. Should a higher expenditure rate become necessary, we are prepared to support it. The ammunition production program has required the reactivation of 10 standby Government ammunition plants and, in addition, a large segment of U.S. industry is participating.

The aircraft production program is equally significant. Production rates for the F–4 and for several of our helicopters have been sharply accelerated. Equally important has been the greatly expanded production of aircraft repair parts needed to keep the air fleets operating.

But the war demands more than munitions and aircraft. Its effect is also felt by the Defense Supply Agency (DSA) which furnishes the soft goods and common items of supply. DSA's contracts in FY 1966 totalled $4.4 billion, up $2.6 billlion from the prior year. Two interesting examples of DSA's contributions are the new lightweight combat uniform and the new tropical combat boot. Both items were originally intended only for the Army's Special Forces Units, but their characteristics were particularly well-suited to Vietnam and they are now being furnished for all of our combat forces there. Since June of last year, DSA has awarded contracts for more than five million of these uniforms, and over one million have already been shipped to Vietnam. The tropical boot has required the establishment of six production sources and the development of new molds and bonding processes. Again, over a million pairs have already been delivered to Vietnam.

The supplies and equipment needed in Vietnam involve a very large proportion of the more than three million different items stocked by the Military Services. Each of these items, in its own way, can be essential to operations at any one time or place. Stocked all over the world, in hundreds of supply points, the centralized control of these items and the assurance of their availability at the time and place needed is an extremely demanding task. Anyone who has had experience with large supply systems, in Government or in industry, knows that somewhere, sometime, some place, something will be lacking. This will occur no matter how much money is spent. It simply reflects the fact that no system involving hundreds of thousands of people and millions of items spread around the globe can ever be 100 percent perfect.

Despite the difficulties involved, our supply systems have provided what was needed. This fact has been repeatedly emphasized by our senior military commanders. General Westmoreland has stated that there have been "no shortages in supplies for the troops in Vietnam which adversely affect combat operations or the health and welfare of the command." General Wheeler, the Chairman of the Joint Chiefs of Staff, and other military leaders who have inspected our combat operations in Vietnam have come to the same conclusion.

The accomplishments of the Military Services gain added significance when the circumstances under which they have been attained are fully appreciated. We have deployed 315,000 troops to Vietnam and mounted an accelerated defense production program during a period when the U.S. economy has been operating at unparalleled levels of civilian demand and general prosperity. Yet we have met our needs without imposing the usual wartime controls.

- No mobilization has been decreed, either partial or otherwise.
- No reserves forces have been ordered to active duty.
- No significant restrictions have been placed on the civilian economy.
- No economic controls over wages, prices, profits, or materials have been imposed.

Yet all of our military commitments have been met and we hold in readiness a strong reserve force and a healthy and productive economy to meet any additional contingencies that may arise.

Clearly the logistics accomplishments of the past year could not have been achieved without the wholehearted and able support of American industry. We must continue to work productively together. It is important that we give you as much advance notice as we can of our military requirements. It is important that you meet your production schedules and hold your costs to a minimum.

Excerpt from address by Hon. Alexander H. Flax, Asst. Secretary of the Air Force (Research and Development), at American Institute of Aeronautics and Astronautics Space Simulation Conference, Houston, Tex., Sept. 8, 1966.

Hon. Alexander H. Flax

Space Technology Comes of Age

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. . . the high vacuum technology which was in the first instance the source of much of the initial knowledge for space simulation has now begun to benefit from some of the technical advances made in the development of space simulators. Similarly, in the field of aerodynamic decelerators, parachute development for high speed military aircraft use in the period during and after World War II provided the basis for space capsule recovery both manned and unmanned; continuing development of parachute space capsule recovery systems, in turn, provides a significant source of new ideas on parachutes which must operate under high shock or higher speed conditions.

It is this interdependence of various fields which characterizes the social environment of modern science and technology and is, I believe, the correct interpretation of what some have sought to describe in terms of technological fallout theory.

It would be absurd to argue that, if better high vacuums are needed for thin film deposition, we should concentrate research and development work on better space chambers or that, if we need controllable parachutes for improved tactical airdrop,

we should concentrate more effort on parachute-guided maneuverable reentry vehicles.

Nevertheless, it can be argued that, if two complementary efforts with quite different objectives in high vacuum systems or in parachute decelerators exist, the total output of these efforts may well be greater than the sum of the parts.

Thus space technology may be said to have come of age in a purely technical sense. It is now a full partner with other technical fields lying on the frontiers of the technical application of knowledge. Such fields are characterized not by a static, unchanging body of knowledge, concepts and techniques, but a dynamic interaction between new scientific and technical and the economic, social, military, or political factors affecting applications. Of course, almost any area of technical application, no matter how mature, is susceptible to upset by a new discovery. Witness, for example, the relatively old and stable art of shipbuilding in which roll stabilizing venes and, more recently, the "bulbous nose" have proven to be significant innovations as evidenced by widespread application. In the technical fields near the frontiers of the application of knowledge, the occurrence of much innovations is more frequent and their nature more radical.

But there are other and more dramatic evidences that space technology has come of age. Here at Houston we cannot better begin an enumeration of such evidence than by citing the steady measured pace of accomplishment in the Gemini Program. It would not be proper to describe the achievements in this program as routine since almost every flight introduced some new and previously untried element of manned space operating capability; yet the discrete operations from launch to recovery have come to be performed with such predictability that there is a strong temptation to regard some of them as almost routine.

The two major large vehicle development programs which we in this country have been pursuing and which are presently in flight status have achieved a degree of success, even in early development launches, which would have been considered only remotely believable had it been offered as a prediction five years ago.

The evident reliability which has been designed and built into these vehicles has been accompanied by a decrease in the unit cost per payload pound launched into low orbit to figures on the order of $500.

The reliability of space launch vehicles is a significant factor to the user and will remain so no matter what the reduction in the costs of launch vehicles may eventually be, as long as payload costs remain high, but cost is not the only factor here. Failure to launch at the prescribed time can be a major detriment in certain types of missions. In the period when the reliability of space launch vehicles was unacceptably low, there were many hypotheses as to what approaches might be used to improve the launch vehicle reliability. Among these were:

- Particularly simple designs with minimum mechanical and electronic complexities were to be preferred.
- Repetitive experience with specific hardware was necessary.
- Rigorous discipline to limit even minor changes had to be exercised.

There is no doubt even today that all of these factors have a bearing on the reliability of launch vehicles. However, the application of rigorous engineering disciplines in design, manufacture, qualification testing and, more important than any of these, launch procedures has proved to be single factors.

It probably remains true that the cost of applying these rigorous procedures can be minimized by adherence to some of the precepts which had been advanced earlier, but it is now clear that even entirely new vehicles can be made to achieve a high degree of reliability early in their test program as long as the maximum advantage is taken of experience both in the hardware and in an engineering sense.

Up to this time, almost all of the DOD and NASA missions in the payload category above 200 pounds have been launched with vehicles which drew heavily on the technical and operational maturity of hardware derived from the ballistic missile program, principally Thor, Atlas and Titan. In the near future, entirely new rocket motors and launch vehicles, particularly those under development for the NASA Luner Landing Program, will alter this situation.

Also, on the DOD side, the Titan IIIC solid motors represented a development "ab initio" although the technology for such motors depended in major degree on Polaris and Minuteman antecedents. However, up to this point, our national launch vehicle program has had an "erector set" or building block character. Elements of the Thor, Atlas and Titan have been mated with the Agena stage and other upper stages and, in the case of the Thor and Titan, augmented with strap-on lower stages. These vehicles, such as Thor, Thor-Delta, Thrust-Augmented Thor, Atlas-Agena, have demonstrated reliabilities (expressed at the ratio of successful launches to total launches) of 90 per cent or greater during the past year.

The use of building blocks has, therefore, already been demonstrated to be capable of furnishing a highly versatile, effective and reliable family of launch vehicles in spite of the conceptual and philosophical arguments which are sometimes advanced against this approach primarily on the ground that it precludes the optimization of particular launch vehicles for particular missions.

For economic reasons, as well as the sound engineering reasons mentioned before, the building block concept in launch vehicles is undoubtedly here to stay, but it is safe to say that the building block inventory will gradually expand over the next several years as the Saturn I-B and Saturn I stages reach maturity.

The success of space systems performing operational tasks of military or civilian value is also noteworthy. The civilian and military communications satellites, the meteorological satellite program, the Vela nuclear test ban monitoring satellites, and the Transit navigation satellites are significant examples of what has been accomplished.

At least some of these systems compete with earthbound systems which can perform similar tasks, and the progress and visibility of these systems can be measured by dollars and cents comparisons with their earthbound competitors. That the outlook for those systems is bright is indeed a good indication that space technology has come of age.

The series of unmanned satellites for exploration of the solar system, Ranger, Surveyor, Lunar Orbiter, have also reached a stage of performance which illustrates how much progress has been made in space tech-

nology. The essence of what has been demonstrated is that, by adequate engineering and planning, monitoring of the fabrication and assembly, and qualification and functional testing in realistic environments, it is possible to attain a high probability of success initially, and that this is the efficient and economic way to conduct such programs.

The main function of technical and program management is to relate what is technically achievable to the resource allocations, schedules and costs. While this is being done, there is often great impatience about the delay in initiating full blown development programs, but the experiences of the last ten years have clearly shown that starting a program hastily on an open-ended basis is not, in general, the short route to success.

In all of what has been said, I have attempted to interrelate those things which mark a competent and effective technology; the capability to plan and execute projects which involve the application of scientific and engineering knowledge to a specific practical objective with the minimum expenditure of resources which will accomplish the desired result. The degree to which programs can be planned and executed with regard to the minimum expenditure of resources depends, of course, on good management. It also depends on being able to assess from experience and by a judicious combination of analysis, simulation and tests, just what resources can be expected to produce given technical results; and to assess within rather narrow limits what confidence can be attached to such estimates. This is the mark of a technology which can be said to have come of age, and it is this mark which space technology has now reached as a result of technical progress and both technical and management experience in a wide variety of programs.

I believe that emphasis on accomplishment with minimum expenditure of resources will be increasingly important in the future since it will determine in considerable measure both the scope and the rate of progress of our space effort.

The reasons for this are clear. Where space systems compete with earth-bound systems, as is particularly true in progress aimed at scientific investigations and the exploration of space, the total amount which can be done is necessarily limited. I would like to clarify this last statement because it is so easily misunderstood.

The advance of space technology which we have witnessed in the past ten years is typical of a situation which has occurred in many other fields of scientific and technical research and development. Science and technology now offer us not only many alternative ways of performing many new tasks, potentially useful in either military or civilian applications. It would be neither possible nor practicable to proceed on the full scale development of all systems which the technology makes possible.

As you know, the Federal budget for research and development test and evaluation has experienced a steady and phenomenal growth over the past 25 years. Even expressed in percent of a growing gross national product, the Research, Development, Test and Evaluation (RDT&E) budget has gone from seven-tenths percent in 1941 to almost three percent in 1965. Most recently, we have been through a period of highly accelerated growth, in which the initiation of a massive space program added to a rising curve of cost for development and acquisition of ballistic missiles, resulted in RDT&E growth rates in the neighborhood of 20 percent per year.

Some people have tended to think of this maximum achieved growth rate as now ordained to be the natural order of things and destined to continue indefinitely. This trend, if it were to continue from the level of 1964 for ten years, would result in a Federal RDT&E budget in excess of the total budget of today by that time. The need to make selections from among many technical possibilities and to control the cost of our research and development activities should not be regarded as a problem. The situation bespeaks a very healthy scientific and technical posture for the nation. Further, the fact that science and technology now offer us many more things to do than we can possibly afford is hardly to be interpreted as meaning that progress and growth is at an end or on a plateau; it does, however, point up the need for selectivity and a situation in which progress offering small benefit at high cost will not survive.

The problem of making selections in research and development is, of course, to some degree a matter of speculation; the speculation relates not merely to the probability of achieving success but also to achieving that success at a reasonable cost in relation to the benefits to be obtained. Because we are now in many cases faced with programs whose estimated cost is of the order of one billion dollars, decisions and commitments cannot be made lightly.

I have had officers and civilians who were concerned with aircraft development at Wright Field in the 1930's point out to me that, as majors or civilian P4's, they were making without review decisions of the kind which now go up to the highest echelons of the Air Force and DOD.

I am compelled to point out to them that in 1937 the Army Air Corps research and development budget was five million dollars and that, even allowing for the differences of bookkeeping and converting to equivalent 1965 dollars, they were making rather small commitments of national resources. Further, at the then prevailing cost levels, we could afford to pursue several alternatives in parallel so that no one program decision had as much impact as many of those we must make today.

The need to make hard choices in the research and development program is, of course, perhaps the key problem in overall program management and we do seek all the assistance we can get from people inside and outside the Government in assessing both the potentials and risks of various proposed programs. One commonly used aid to management is the advisory committee, and we in the Air Force are most appreciative of the time and energy which many eminent and already overworked people put into their efforts in advising us. We also derive great benefits from the advice they give us.

Nevertheless, advisory committees rarely can put their findings into an overall R&D program context—they can indicate whether a given line of technical effort in a specific field is promising and make suggestions as to how specific programs should be planned and scheduled. This sort of report is extremely valuable and, in some areas, we could hardly proceed without such an evaluation, but generally it does not in itself provide a

sufficient basis for a decision to proceed with any program.

The situation was epitomized in Warren Weaver's essay, "The Report of the Special Committee." As many of you will recall, that standard report essentially concluded with five points: The scientific field, X, is of critical importance and it is essential that we deepen our knowledge in this area; the field X has been meagerly supported in the past and there is every reason to believe that modest but substantial support (say 20 times the present level) could promptly lead to results of the highest significance. And so it goes on to the fifth conclusion which is that, although the committee deplores international rivalry in science, it feels compelled to point out that the Russians appear to be ahead of us in field X. This applies to any subject—geography or oceanography or arctic exploration or space—it really doesn't matter, you fill in the subject. I am sure you have seen many such reports.

In summary then, space technology has arrived at a point in its maturation where it is now possible to plan and execute a wide variety of program options with a reasonable degree of confidence as to attainment, schedule and cost. We must, however, increasingly turn our attention, as in other fields of engineering, to the economics of our programs; this, lest it surprise anyone, is a normal function of the engineer.

Sometimes it has been forgotten that advancements in technology can be used to reduce the cost of a program as well or better than it can be used to eke out the last iota of vehicle performance. With the basic space technology which we now have in hand, and its continuing growth based on specific program experience and the very considerable national effort in research, exploratory and advanced development which feeds the technology, we have the technical means for defining and achieving our national objectives in space, both military and civilian. With growing maturity, however, comes growing responsibility for carrying on the activities made possible by space technology with wisdom, good judgment and a high regard for properly utilizing the resources of our society and our economy.

Address by Capt. J. L. Howard, SC, USN, Dir. of Procurement, Office of the Asst. Secretary of the Navy (Installations & Logistics), at the National Aeronautics and Space Administration Logistics Management Symposium, Huntsville, Ala., Sept. 13–14, 1966.

Capt. J. L. Howard, SC, USN

Contracting for Logistic Support

In contemplating the subject of contracting for logistic support, it is appropriate at the outset to look at a bit of history, review present trends in contracting in general, and put the support question in perspective.

History.

Throughout the 19th Century, the Army and Navy relied very heavily on Government-owned manufacturing facilities for the production of its heavy weapon systems. The Navy had its shipyards and ordnance plants. The Army had its arsenals and ordnance depots.

The 20th Century brought the airplane, and the airplane, in its turn, brought some new approaches to the production of major systems.

Without going into the details of basic national policy decisions which were made in the 1920's, suffice to say that the idea of Government reliance on private enterprise for the production of aircraft became well established between World War I and World War II.

As this reliance matured, grew and flourished, we saw also the leaps and bounds in technological progress that came with the 1940's and 1950's.

We are now in an era of technological complexity that involves the convergence of many divergent disciplines in the production of operating hardware. Electronic sciences now have interfaces with powerplant disciplines. These, in turn, have bearings on the human sciences, and we see the need for concurrent efforts and trade-offs between the various possibilities and limitations in chemistry, metallurgy, biology and hosts of other lines of scientific and engineering endeavor.

Present Trends.

The trends that began in the 1920's, i.e., reliance on industry and the growing complexity of technology, are continuing today.

In the field of Government contracting, the trends are keeping pace, both in complexity and in seeking to strengthen the economic basis on which the United States has become prosperous and powerful.

Specifically, the trend in DOD procurement policy is to stimulate competition among private industrial complexes, and to shift the burdens of risk to the private sector of the economy.

More specifically, the Navy today has an expressed policy, issued by Secretary Nitze, that seeks not only to intensify competitive effort among Navy suppliers but, equally important, to assure that the benefits or competition be kept inviolate through a policy of "hands off" during the contractor's performance of the contract.

Along with this expressed policy is the move toward more specific determination of the performance, quality and reliability we want in our hardware, and less dependence on detailed blueprints, drawings and design specifications.

Compare, for example, the Navy's traditional approach to ordnance production and shipbuilding. In these areas we have for decades been the recognized experts. We could conceive, create, design, develop and build naval guns and ships. We had, and still have, a womb-to-tomb capability, including a capability for support.

We have never had this in the same degree in aeronautics. We have acknowledged experts in aircraft and powerplant design. But generally, we have for years relied very heavily on the initiative, impetus and imagination of industry.

In aeronautics we have stated, in terms of performance, quality and reliability, what we want the airplane to do, where it is to fit in a carrier configuration, and how it should operate at sea. But we have left most of the graphic details to industry.

We are beginning to apply that philosophy in other fields as well. The Fast Deployment Logistics Ship (FDL) project is a case in point. The same is true in certain missiles, torpedoes and communications equipments.

We are saying, in effect, that we will specify to industry what we want the system to do, and it is our intention to draw on industry's imagination and profit motive to do the rest.

There are a number of illustrations of these trends in action. We are driving hard to reduce the use of Cost-Plus-Fixed-Fee (CPFF) contracts and shift to incentive types and fixed prices. Those place the burdens of economic risk on the contractors.

We are using weighted guidelines which have specific factors for company contribution, company risk, etc.

We are moving in the direction of total procurement in which the Air Force has been a pioneer.

Perspective.

Now, to put these things in perspective, it is important to look at this question of risk.

The risk to a contractor in a fixed-price contract, or in incentive-type contracts—cost or fixed price—is clear. It is primarily a matter of economic risk. The survival of the company is at stake if it overruns its costs to such an extent that it folds.

There are risks to the Government as well. The risk, from the Government's standpoint, is in failing to get either what it wanted or when it needed the item. This is particularly critical in the military fields.

This means, therefore, that the contract must be a finely balanced instrument that contains the right amount of risk for the company, and the right amount of incentive reward, to give the company the necessary motivation to succeed in performing the contract. We do not want to drive any company out of business. That is not in our interest whatsoever. This is why, from our standpoint, the penalties for degrees of shortfall must be reasonable.

On the other hand, the penalties for shortfall must be stringent enough to hurt. And the incentives for success must be worth the effort to gain the rewards.

While we consider these factors, however, the Government must also have a contract that gives it reasonable confidence that the right quality will be delivered on time at reasonable cost.

The achievement of such delicately balanced contractual instruments is most difficult. In reviewing most of the contracts we have today, one might question whether we have yet achieved the perfect balance desired.

Now, the perspective required here is that we have been discussing the problem of development and production. Following these things is the problem of support—continuing support.

Clearly, in the area of major weapon systems, we are always in a state of calculated risk. We assess the threats at sea, in the air, below the sea, in space and on land. We determine what we need to meet those threats. And we designate the time frame within which, or the time by which, we need the capability required.

If we do not make it, the threat is magnified. Think back to Sputnik and remember the pressures we were all under in those months following that turn of events.

Now, when we do, in fact, have a hardware capability in the hands of the men who must use them, and we have the trained men, the vehicles, and all it takes to operate the weapon systems, the question of support becomes absolutely critical.

Awesome though it is to contemplate that a hardware capability might not be at hand when we need it, it is equally critical that we have assured and continuing support for those weapons that are at hand.

The Problem.

The problem in the area of support, therefore, is in getting absolutely certain support. There can be no if's or but's about it. We must.

The problem is to structure contracts so carefully as to provide airtight response. If we do not get the material we need in support, we can lose skirmishes, battles and wars. We can penalize the contractor under the contract, but this would be small penalty compared with being loser in war.

In the Services, of course, we meet this problem by building up our own in-house capabilities for supply and maintenance support, complete with overhaul depots, repair facilities, supply installations, stock levels of supplies and war reserves.

Of course, we do, in fact, rely on commercial suppliers for a lot of these things, too. We send many equipments back to commercial plants for rework, overhaul and modification. We use basic ordering agreements and indefinite quantity contracts for parts support in the expectation that the moment we order something it will be forthcoming immediately.

But generally, the theory has been that operational support must be a matter of command, not contract. This is why we have depots and overhaul shops as organic parts of the Military Services.

This does not mean, however, that we cannot rely on industry for support. On the contrary, we can and do. And, as we have seen in major end-item production, the trend is definitely toward more of the same in the support area.

We are using contractors more and more these days to man our missile ranges and advance bases.

We are using contractors for certain support services, e.g., data collection and processing services.

We use contractors, as indicated, for overhaul, for on-the-spot supply, etc.

But the problem remains one of structuring contracts so carefully as to provide assured support, on time, at reasonable cost.

With the shift from CPFF contracting, the demand upon us for finely structured contracts is greater than ever before. We shift the economic risks to our contractors, but we assume a greater response risk on the Government's side because the higher order contracts carry the strong implication of hands off.

We cannot, for example, pump in more money just to give the contractor more people and facilities to make him more responsive. These actions are not in keeping with the purpose of incentive and fixed-price contracts.

We are, nevertheless, moving gradually to greater reliance on contractors in certain of these support areas. The total package concept is one example. The newly evolved concepts

(Continued on page 41)

High Level Study Group Reviews Expansion of Industrial College Program

The Commandant of the Industrial College of the Armed Forces (ICAF), capstone of the military educational system in the management of national security resources, has been directed by the Joint Chiefs of Staff to review the desirability of broadening ICAF participation in management education and related activities within DOD.

Lieutenant General August Schomburg, USA, who has served as Commandant of the Industrial College since April 1964, will head the study group. He will be assisted by Major General Jerry D. Page, Commandant, Air War College, Maxwell AFB, Ala.; Major General Eugene A. Salet, Commandant, Army War College, Carlisle Barracks, Pa.; and Rear Admiral Frederick H. Schneider, Jr., Chief of Staff, U. S. Naval War College, Newport, R.I.

Objective of the study is to determine whether or not it is feasible and desirable for the Industrial College to assume functions in management education and training that extend beyond its current mission. The college is also directed by the Joint Chiefs to consider alternate methods. The study pertains to administrative management of resources, as distinguished from military management of combat forces. Findings are to be reported by the end of the year.

Areas being studied include research and dissemination of information on the latest developments in management practices; seminars to be conducted at local levels to improve communications with mid- and top management; and a highly professional and scholarly journal which would serve to encourage original contributions and provide a mechanism for improving communications concerning management.

The project has been named the Management Education and Training (MET) Study.

Colonel Peter P. Dawson, USAF, director of the college's Office of Academic Plans and Research, is in charge of planning and research phases of the study.

A working group of some 16 members will assist in the study. Planning, research and administrative aspects are being handled by Industrial College staff and faculty members, augmented by representatives of the Army, Navy, Air Force and Marine Corps assigned to the college on temporary duty.

Powerful Continuous-Beam Gas Laser at Work in USAF Lab

A continuous-beam gas laser which produces an invisible infrared beam from electromagnetically-stimulated carbon dioxide, powerful enough to burn through a high-grade firebrick in five seconds, is now in operation at the Air Force Weapons Laboratory, Kirtland AFB, N.M.

Said to be the most powerful continuous-beam laser in the world, the laboratory's Effects Branch is using the 500-watt infrared output to study interactions of the laser beam with various materials. The laser has proven an excellent device for focusing controlled amounts of energy upon target materials.

As is characteristic of lasers, there is no heat in the beam of light projected. The heat is generated in the target material as the light is absorbed.

The device consists basically of a double-walled glass tube 44 feet long. The inner portion of the tube is filled with a mixture of carbon dioxide, nitrogen and helium. The outer section is filled with water which circulates constantly through a heat exchanger, cooling the laser tube.

When operating, the gas mixture is fed constantly into the system, with the used gas passing through an exhaust system into the air outside the building. This eliminates any possible carbon monoxide hazard.

At one end of the tube is a gold-plated mirror which reflects light back into the gas mixture. As the laser action takes place, the beam is emitted through a window made of salt in the opposite end of the tube.

The salt window, a single sodium chloride crystal two and one-half inches in diameter, absorbs none of the energy of the beam, and reflects about eight percent of the energy back into the tube to keep the lasing action in progress. Target material is placed in a carefully shielded area near the salt window.

The salt crystal is a limiting factor in the amount of time the laser can be operated at full power, for it requires replacing after about two hours of continuous use. Also, like common table salt, the crystal absorbs moisture from the air. This moisture eventually causes the crystal to turn cloudy, again necessitating its replacement.

Army Engineers Award Contract To Study Reactor Concept

A feasibility study of the Terrestrial Unattended Reactor Power System (TURPS), an advanced mobile nuclear reactor concept designed to fill a large number of electric power requirements of the Armed Forces, will be conducted by the Martin-Marietta Corp., Nuclear Division, under a contract from the U.S. Army Corps of Engineers.

Work under the nine-month, $286,-898 contract will be directed by the newly formed Research and Technology Department of the Nuclear Power Field Office (NPFO), a Corp of Engineers' agency at Fort Belvoir, Va.

The study follows a conceptual design by the Martin Co. for the U.S. Air Force of a 100-kilowatt, direct conversion reactor power system that would operate unattended without refueling for five years.

Proposed as a power source for remote installations such as radar sites around the world, the majority of which are powered by diesel generators requiring frequent servicing, the TURPS power plant employs a new development in the state of the art of nuclear reactor control which eliminates the need for mechanically operated control rods. Control of the reactor is accomplished solely through the migration of hydrogen into and out of the fuel element from a reservoir at the bottom of the fuel element.

The extremely mobile unit can be disassembled into two parts and easily shipped by conventional cargo aircraft or trailer truck. The plant is designed for field installation using standard military equipment, and is capable of being placed in operation in about seven hours.

Navy Accepts A-7A Corsair II

The U.S. Navy formally accepted the A–7A Corsair II light attack bomber during ceremonies at Cecil Field, Fla., on Oct. 14. The first two A–7A's were accepted by the Commander, Naval Air Force, U.S. Atlantic Fleet, and will be incorporated into Fighter Squadron 174 for training at Cecil Field.

Delivery of the Corsair II, an aircraft especially designed to carry out the attack and close support role, came only 13 months after the aircraft's initial flight on Sept. 27, 1965.

The Navy will conduct A–7A carrier suitability tests at sea during November and December 1966 and is proceeding with on-schedule fleet deliveries.

The A–7A is produced by Ling-Temco-Vought, Inc., Dallas, Tex.

Getting Formal Advertising Over the Hurdles

By
Milton E. Jones

Fortunately or unfortunately, we are all creatures of habit, but habits can be broken by open minds. Judge Wyzanski put it quite concisely when he said, "One of the dangers of extraordinary experience is that those who have it may fall into the grooves created by their own expertness. They refuse to believe the hurdles, which they have learned from experience are insurmountable, can in fact be overcome by fresh, independent minds."

Because of wars and national emergencies, negotiation of defense contracts became a habit.

During the first World War, negotiated cost-plus-a-percentage-of-cost contracts were popular, especially with contractors.

During World War II and subsequently, the negotiated cost-plus-a-fixed-fee (CPFF) type of contract was popular. At least, this method of procurement limited the fee but it did not preclude the incurrence of costs which under more advanced types of contracts would have been avoided. In some instances, cost-type contracts have facilitated corporate expansion largely at Government expense.

Prior to the Korean Conflict, the Armed Services Procurement Act, Public Law 413, was passed. Its implementation began in 1948. This law was and is a good law. It was conceived by some of the most dedicated and knowledgeable people in the Congress and in the Armed Services. Its fundamentals are based upon decades of experience. It is a law which recognizes the facts of procurement life in the Armed Services. Although Public Law 413 states that ". . . All purchases and contracts for supplies and services shall be made by advertising, . . ." it authorizes exceptions which give the most practicable flexibility to the negotiation of contracts under stated or justified circumstances. The Armed Services could hardly have asked for a law with greater flexibility. It is interesting to note that, although minor revisions have been made to the law, its basic concepts remain unchanged.

Before a great deal of precedent had been set in the implementation of the Armed Services Procurement Act, our nation was faced with the Korean Conflict. President Truman declared a National Emergency in December 1950 and, as a result, exception (1) of the Act was invoked. This exception authorized negotiation if ". . . determined to be necessary in the public interest during the period of a National Emergency declared by the President or by the Congress." For approximately the next five years, negotiation was the order of the day. In most major procurement organizations, formally advertised procurement became a lost art. During the early part of the Korean Conflict, our primary goal was to place orders and fill the capacity of those companies capable of meeting urgent requirements. Pricing was important but was appropriately secondary. Reliance was placed, to a large extent, upon CPFF contracts, or upon negotiated redeterminable price type contracts as a means of permitting a "second look" in an effort to avoid exorbitant profits. Advertised procurement was considered much too inflexible and time consuming during this period.

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As the Korean situation stabilized, there was a recognition of the need for laying plans to return to a more normal peacetime procurement atmosphere. In 1955, the Navy on its own began the justification of negotiation on a case-by-case basis and discontinued the general use of the blanket emergency exception. Some operating personnel opposed this action as additional effort which was both unnecessary and nonproductive. The convenient use of blanket negotiation under the emergency exception had become a habit. Nevertheless, in 1956, the use of blanket negotiation under exception (1) of the Armed Services Procurement Act was effectively discontinued throughout DOD. It became necessary to justify negotiation on a case-by-case basis in accordance with the applicable exception to the use of formal advertising. Although there was some reemphasis on the use of formal advertising, major emphasis was placed upon precise justification of authority to negotiate under the various exceptions of the law. Negotiation was still a habit.

Beginning in 1961, the Pentagon took a new look at defense procurement methods. Steps were taken progressively to increase competitive procurement, promote the use of fixed price and incentive contracts, reduce the use of CPFF contracts to a minimum, avoid the use of letter contracts to the extent practicable, and increase the use of formal advertising. Although the pattern was not always clear, it was made patently evident by DOD management that "business as usual" was no longer acceptable.

In 1962, Public Law 87–653 (the "Truth in Negotiation" law) amended Subsection 2304(a) of Title 10 of the U. S. Code to read as follows: ". . . Purchases of and contracts for property or services covered by this Chapter shall be made by formal advertising in all cases in which the use of such method is feasible and practicable under the existing conditions and circumstances." This revision was implemented in the Armed Services Procurement Regulation (ASPR) in such a manner as to make it clear that, even though technically

a particular procurement came within the meaning of a specific negotiation exception, formal advertising would be required if it were feasible and practicable under the circumstances. The law and the regulation clarified the position of the Congress and gave renewed emphasis to procurement by formal advertising. Revitalization of formal advertising procedures was in progress.

One of the great stumbling blocks to the increased use of formal advertising has been the complex technical nature of defense material and equipment and the lack of an adequate data package, which would indicate precisely what was required.

During hearings in early 1957 before the Subcommittee for Special Investigations, House Committee on Armed Services, the subcommittee suggested that the Armed Forces accomplish certain procurements in two parts. The first part would solicit and evaluate technical proposals without reference to pricing, and the second part would solicit sealed bids under normal advertising procedures from only those firms having acceptable technical proposals.

At the conclusion of the hearing, the Air Force agreed to test this procedure within the Air Materiel Command for a period of six months. At the end of these tests, the Air Force reported back to the committee that the use of the two-step procedure, now known as Two-Step Formal Advertising, had its drawbacks, but that the Air Force considered its initial tests warranted further use of the technique.

In November 1958, the Chief of Naval Material authorized the Bureau of Aeronautics to conduct trial procurements utilizing the two-phase formal advertising procedure. In July 1959, after completion of its test, the Bureau of Aeronautics recommended adoption of the two-step formally advertised procedure.

Original ASPR coverage was achieved in the summer of 1960.

In August 1962, the Comptroller General (Decision B–149531) gave his blessing to the use of two-step formal advertising. Although by this blessing two-step formal advertising became a formally recognized method of procurement, its potential was yet to be achieved.

The use of two-step formal advertising is dependent upon the expected availability of adequate competition both in the technical evaluation phase and in the pricing phase. Adequate competition may exist in any instance where there is more than one potential source. On the other hand, the existence of several sources may not of itself assure adequate competition. Reasonable judgment must be exercised, based upon the circumstances of each given case.

Advertised procurement, two-step or otherwise, has been associated with items which are not of great complexity. However, the Navy procured its requirement for Talos missiles on a two-step, multi-year formally advertised basis. This missile is indeed complex and for more than ten years had been procured from a sole source. Initially, there was substantial difference of opinion in the Navy as to the propriety of using the two-step formally advertised procedure. It was only after the project manager had heard all sides that he decided to use the two-step approach. This particular project manager accepted the fact that cost analysis and detailed negotiation of price were not essential and that his requirement could be satisfied effectively by two-step formal advertising. He was convinced that this procedure was feasible and practicable. The award for the multi-year procurement was made at a unit price of approximately 58 percent of the previously negotiated unit price.

The Navy considers this procurement to be a fine example of the practicability, feasibility and economy of using two-step formal advertising on a multi-year basis to procure a complex and technical item.

Let us now touch upon another area where formal advertising is being expanded effectively. This area involves life cycle costing which is being given considerable emphasis throughout DOD. Because of the difficulty in establishing criteria and the basis for evaluating these criteria, it may appear on the surface that the only feasible and practicable method of procurement would be by negotiation. On the other hand, positive establishment in writing of these criteria and the basis for their evaluation permits all bidders to know where they stand at the outset and to bid accordingly.

The life cycle costing technique, combined with two-step formal advertising and multi-year procurement, is indeed a feasible and practicable method of forcing the establishment of precise and understandable criteria and of assuring positive and uniform methods of evaluation. Of course, the same benefits accrue in this type of procurement as accrue in similar negotiated procurements with respect to increased competition generated by larger quantities produced over an extended period of time and greater standardization achieved by continuous production by the same source.

Life cycle costing is designed to give maximum value for dollars spent. The number of guaranteed service hours, mean time between failures, operability, maintainability and reliability are all significant aspects of the total cost of an item during its useful life. Also, the introduction of a new item into the supply system adds to the problems of supply, inventory, operations, maintenance and training, all of which should be taken into consideration in evaluating the net cost to the Government.

As an example, the Navy had procured for itself and the Air Force a sizeable quantity of 30 KVA Generator Systems and was preparing to make a further procurement to meet additional requirements. It was decided that competition would be obtained for the additional requirements and that factors of supply, maintenance and reliability would be taken into consideration and evaluated in determining the lowest net cost to the Government.

Two-step formal advertising on a multi-year basis, plus evaluated net cost to the Government, was chosen as the proper and most effective method of procurement.

Although the following is not a precise comparison, because of differing quantities and delivery schedules, it will give a fair idea of the results which were obtained.

The initial purchase of the 30 KVA Generator Systems was made during FY 1965 under a two-step, multi-year formally advertised procurement. Two companies submitted technical proposals and bid on the second step. Award was made for a single year to the low bidder at a price of $1,775.12 for the Navy generator and $1,792.82 for the Air Force version. A single year award was made because prices quoted on

the multi-year basis were higher than on a single year basis.

Later in the same year, the second procurement of the 30 KVA Generator Systems, which is the case in point, was processed, as previously indicated, on a two-step, multi-year, evaluated-net-cost-to-the-Government basis. Technical proposals and bids were received from the same two companies which had submitted bids on the original procurement. Award on the multi-year (5 years—1966–1970) was most economical. Company A (the current producer) bid a unit price of $1,403.95 for the Navy version and $1,420.45 for the Air Force version. Company B bid a unit price of $1,683.00 for both. Considering the factors to be evaluated—cost of preventative maintenance, overhaul costs, spare and repair parts, price of support equipment and transportation—Company A's total bid price was $4,154,237.84 and Company B, $4,963,267.82. Thus, Company A was low on both an unevaluated and evaluated basis. In this rather complex advertised procurement, technical and evaluation factors were ironed out in the first step so that, as designed, the second step was merely a pricing action. Although in days gone by, it is quite likely that the 30 KVA's would have been negotiated, by careful planning, sensible communication and precise preparation and understanding of the Invitation for Bid, formal advertising was "feasible and practicable."

It is also interesting to note that substantial procurements of warships are being made through the use of straight-formal advertising. During FY 1965, 22 destroyer escorts, nuclear-powered attack submarines, three guided missile destroyers and 22 various other smaller craft were procured by formal advertising.

From these examples, it is obvious that the use of formal advertising need not be restricted to standard, off-the-shelf, commercial-type items and that, when formal advertising is used in accordance with the two-step, multi-year and life cycle costing procedures, it can become a very useful tool in the procurement of some very complex defense items.

It is important to note that it is usually less time consuming to solicit technical proposals under the two-step procedure, evaluate these proposals, solicit bids and make an award than it is to justify negotiation, solicit quotations, evaluate proposals, obtain cost breakdowns, perform audits, negotiate an acceptable contract which requires substantial review prior to award and, finally, make the award.

We are all concerned with contractor's responsibility and there are certainly those who feel it is much easier to award to a responsible source through negotiation rather than by formal advertising. With respect to this "feeling" Secretary McNamara, over two years ago, had this to say:

> **". . . Full understanding of the importance of affirmatively determining that the prospective contractor is responsible should assist our efforts to increase the use of formally advertised procurement. Use of negotiation is never justified by a fear that advertising may lead to award to a contractor who is unlikely to perform satisfactorily. The standards of responsibility for contractors are precisely the same for advertised as for negotiated procurements. If a company would be rejected as not responsible, notwithstanding a low offer in a negotiated procurement, the same company should be rejected notwithstanding a low bid on an equivalent advertised procurement. The contracting officer has the same right and duty to determine nonresponsibility in one case as in the other."**

Determining responsibility of a source is not a matter related to the method of procurement but is a matter related to facts and intestinal fortitude.

In an effort to develop a full range of contracting ability, bring technical and procurement personnel under the same command authority and, in so doing, to increase the use of formal advertising, the Commander of the Naval Material Command has directed the commanders of the Naval systems commands to be completely responsible for those technical procurements which are under the control of each respective command and which can be handled through the formal advertising procedure. Certainly, closer proximity and greater familiarity with formal advertising procedures should contribute to a substantial increase in their use.

Familiarity with formal advertising procedures and the wealth of General Accounting Office decisions which have resulted from its use should be an objective of industry as well as Government. Too frequently, industry is not responsive because of minor deficiencies and exceptions which could and would be avoided if the procedure was more comprehensively understood.

Formal advertising requires precise delineation of the specific requirement and all of the terms and conditions attendant thereto. Where its use is practicable and feasible it has many benefits both to the buyer and seller.

It may be expected that with some introspection, imagination and downright forceful effort, many instances may be found where, although negotiation can be justified, formal advertising may, in fact, be "feasible and practicable."

New Lightweight Body Armor Provides Buoyancy in Water

A combination body armor-life vest, which provides buoyancy in water as well as protection against explosive ordnance, has been developed by the Navy's Clothing and Textile Laboratory at the Naval Supply Center, Bayonne, N.J., and is now being tested in Vietnam.

The buoyant body armor weighs only 46 ounces, the same as a standard Navy life preserver. Conventional body armor, made of several layers of canvas-like nylon fabric or rigid fiber glass plate, weighs more than eight pounds.

The Navy lightweight buoyant armor is made of silicone-treated acrylic fiber batting enclosed in a waterproof cover. The silicone makes the fiber water-repellent and acts as a lubricant to reduce friction between the fibers. When the batting is hit by a high velocity metal fragment, the lubricated fibers build up a fibrous "snowball" around the metal fragment core. The snowball enlarges and acts as a brake on the speed of the metal fragment as it intrudes into the acrylic batting.

In laboratory ballistics tests, the new buoyant armor shows at least 80 percent of the protection provided by standard eight-pound armor. The 20 percent reduction in protection is the price of the advantages of buoyancy and of reduced fatigue in oppressive heat, which is compounded by conventional body armor.

Earlier research on the ballistics and buoyancy properties of fibrous battings was conducted by Mellon Institute, Pittsburgh, Pa. under Navy sponsorship.

Guidelines Cited for—

Packaging and Shipment of Dangerous Materials

By
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Military and industrial traffic managers, who share a mutual concern for the hazards involved in the packing and shipping of dangerous materials, are becoming increasingly aware of the need to keep up to date on the best possible procedures as a result of expanding supply operations in Vietnam.

Procedures requiring special care are only as good as the people who execute them, and those who deal with the shipment of dangerous materials need, in addition to a high sense of responsibility, a thorough knowledge of special procedures for packaging.

A survey conducted by the Air Force revealed that during calendar year 1964, the average monthly movement of dangerous materials by Air Force aircraft was 450 tons. The year of 1965 saw an increase in average monthly tonnage to the 1,200-ton mark, and 1966 is expected to show an even greater increase in dangerous materials tonnage. As tonnage increases, so does the number of Air Force flights carrying dangerous cargo, and in 1965 this figure had increased to 75 percent of all flights.

Of course, a mere increase in tonnage should not necessarily call for increased concern on the part of the Defense Department. Additional shipments of dangerous materials, if properly packaged, marked and handled, would not normally be any cause for increased concern. However, when increased shipments are coupled with ever increasing reports of improper shipments, it is easy to understand why so much attention is now being paid to the subject.

During a six-week period, the Military Airlift Command (MAC) received 438 reports of damaged or improper shipments. These reports were mainly based on visual examination of dangerous cargo exterior containers, markings, labels and related documents. The shipments covered by these reports could not be airlifted. Additional time and materials were required to bring them up to standard so that they could be shipped.

Hazards involved in packaging, shipping, or storing dangerous materials can affect property, but the primary concern is the injury to personnel which could occur if packing is not done properly.

What are dangerous materials? The Interstate Commerce Commission (ICC), as well as other regulatory agencies, have provided a definite system of classifying and identifying dangerous materials. The classification indicated by ICC will be considered first.

An explosive, for purposes of transportation, may be considered as any chemical compound or mixture, or device containing such a compound or mixture, which is designed for, and capable of, functioning by explosion, i.e., with instantaneous release of gas or heat. Explosives are subdivided into the following three categories:

- Class A. Explosives which are considered most dangerous and which detonate, or in some other way involve a maximum hazard.
- Class B. Explosives that are less dangerous, and those which function generally by rapid combustion or deflagrating.
- Class C. Explosives which are relatively soft. In general, Class C. explosives are manufactured devices which contain relatively small amounts of either Class A or Class B explosives, or both.

Forbidden explosives are those which are too dangerous to be transported.

A flammable liquid is described as any liquid that evolves flammable vapors in air at a temperature of 80° F., or below, as determined by a method specified in ICC regulations. The vapors from such liquids, when mixed with air in certain proportions, will burn if ignited. If this should occur in an inclosed space, the combustion of the vapor-air mixture may be sufficiently vigorous to stimulate an explosion.

Flammable solids include such materials, other than explosives, which can ignite through friction, absorption of moisture, spontaneous chemical changes, or as a result of retained heat from manufacturing or processing.

Oxidizing materials include all substances, such as chlorates, peroxides, perchlorates, permanganates and nitrates, that yield oxygen readily to stimulate combustion of organic matter.

Acids and corrosives are those alkaline caustic liquids which, when in contact with living tissue, will cause severe damage of such tissue by chemical action; or, in case of leakage, will materially damage or destroy other lading by chemical action; or can cause fire when in contact with organic matter or with certain chemicals. ICC regulations authorize three types of labels for these materials so that any acid or corrosive liquid can be identified appropriately.

A compressed gas is defined as any material or mixture having in the container either an absolute pressure exceeding 40 pounds per square inch at 70°F., or an absolute pressure exceeding 104 pounds per square inch at 130°F., or both; or any liquid flammable material having a Reid vapor pressure exceeding 40 pounds per square inch absolute at 100°F. Compressed gases are considered either as flammable or nonflammable, depending upon the results of certain tests prescribed in ICC regulations.

Poisonous articles are divided into the following four classes according to their characteristics:

- Class A. Extremely dangerous poisonous gases or liquids. A very small amount of the gas or vapor of the liquid, when mixed with air, is perilous to life. This class includes diphosgene, lewisite, mustard gas, phosgene and similar chemicals.
- Class B. Less dangerous poisons, liquids or solids, which are hazardous to health. Oral toxicity identifies those which produce death within 48 hours when inhaled continuously for one hour. Toxicity by skin absorption identifies those which produce death within 48 hours by continuous con-

tact with bare skin for 24 hours or less.

• Class C. Tear gas or irritating substances. Liquid or solid substances which give off dangerous or irritating fumes when brought into contact with fire or when exposed to air.

• Class D. Radioactive materials from which certain rays are emitted that may be hazardous. Radioactive materials emit one or more of four kinds of rays (gamma, alpha, beta, or neutrons). The dangerous emanation of alpha and beta rays can be stopped comparatively easily by efficient wood or fiber packaging. Those that radiate dangerous amounts of gamma rays must be protected by a special shield, usually made of lead. Neutron emanation requires very special protection. Class D poisons are further subdivided into three groups according to the type of radiation emitted. Group I materials are those which emit any gamma radiation either alone, or with alpha or beta radiation. Group II materials emit neutrons and either or both of the types of radiation of Group I materials. Group III materials are those which emit only electrically charged particles, i.e., alpha or beta radiation.

The dangerous materials described above are those as classified by the Interstate Commerce Commission. In addition to these, the Coast Guard also regulates materials in two other categories.

The Coast Guard also lists combustible liquids as any liquids which give off flammable vapors at or below a temperature of 150°F. or above 80°F. Hazardous items include any substance which is liable to spontaneous heating in excess of 10°F. at or below temperatures of 212°F., or liberates vapor susceptible to ignition by a spark or open flame at or below 300°F.

In addition to the materials classified by the ICC and the Coast Guard, commercial aircraft require the classifications of other restricted articles. These materials are described as those which are not entirely suitable for transportation by air without some precautionary packaging. They are divided into the following three categories:

• Group A. Items not otherwise restricted which have noxious, toxic, or irritating characteristics that can cause extreme annoyance or discomfort to passengers and crew in the event of leakage in flight.

• Group B. Liquids only moderately corrosive and solids which are strongly corrosive when they are wet.

• Group C. Etiologic agents and polymerizable materials.

Now that dangerous materials have been described, at least generally, it is necessary that some of the more important documents and publications that regulate the packaging and shipment of such materials be studied.

Interstate shipments, provided that an interstate carrier is not involved, are governed by state and local regulations. Interstate shipments of dangerous materials, as well as intrastate shipments on interstate carriers, are regulated by publications which are generally a part of the U.S. Code.

For clarity, the various documents are indicated in two categories: storage documents and packaging and shipping documents.

Storage Documents.

Army Materiel Command Regulation 385–224, Air Force Manual 127–100, and Bureau of Naval Weapons Ordnance Pamphlet No. 5, Volume 1, deal essentially with the storage and processing of explosives. These documents establish quantity-distance designations (the weight limitation of a given explosive that may be stored within a given minimum distance from a railroad, building, magazine or other facility) and storage compatibility designations.

The amount of explosive material that can be assembled or packaged in a given facility may not depend on available equipment or floor space, but upon the quantity-distance class. Expensive concrete walls, revetments, or additional facilities, not in the budget, may be required to meet processing schedules.

Packaging and Shipment Documents.

Air Force Manual 71–4, a joint service document, titled "Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft," includes a listing of dangerous materials most likely to be within the military supply system, an indication of their acceptability for air shipment, hazardous properties of each material, storage and handling data and packaging and marking information.

The Official Air Transport Restricted Articles Tariff No. 6–3 is a publication relating to the packaging and shipment of restricted articles and is published by an agent for the participating carriers. The tariff contains restrictions which determine whether a particular article will be accepted for transportation and specifies packaging requirements for these items.

Title 14, Code of Federal Regulations, Part 49, provides statutory requirements of the Federal Aviation Agency.

Documentation pertaining to the packaging and shipment of dangerous materials by water is contained in the following regulations:

Agent T. C. George's Water Carrier Tariff No. 16 is a publication issued by an agent for the water carriers and indicates the condition under which the water carriers will accept dangerous materials for shipment. The document is, in effect, a transcription of the U.S. Coast Guard Regulations, with minor additions such as the listing of participating carriers.

The basic legal document governing the transporting of dangerous materials aboard vessels is *Title 46, Code of Federal Regulations, Parts 146 to 149.* This document indicates Coast Guard regulations and, as such, is essentially the same as T. C. George's Water Carrier Tariff No. 16.

CG 108, Rules and Regulations for Military Explosives and Hazardous Munitions, is a publication of the Coast Guard and contains excerpts from Coast Guard Regulations (*Title 46 CFR Part 146*).

Surface documents, or those documents which govern shipment of dangerous materials by truck, express, railway and inland waterways not under Coast Guard jurisdiction, are as follows:

Agent T. C. George's Tariff No. 15, which published the ICC regulations, contains, in addition to other materials, a list of explosives and other dangerous articles by commodity groupings, together with shipping descriptions, packing, marking and labeling requirements, and shipper's certificate of compliance to the regulations. Tariff No. 15 is divided into eight different parts, each part generally pertaining to a different group of carriers and shippers. Of particular note are the shipping container specifications included in this publi-

cation. The document, published by the Bureau of Explosives, is the most up-to-date publication in the field and should be considered the basic publication for packaging and shipping dangerous materials.

In the *Motor Carriers' Explosives and Dangerous Articles Tariff No. 11*, the American Trucking Associations, Inc., is acting as agent for the motor carriers and publishes the ICC regulations. Contents of this tariff are essentially the same as published in Tariff No. 15.

Title 49, Code of Federal Regulations, Parts 71–79, is the basic legal document containing the rules and regulations of the ICC. The description previously indicated for George's Tariff No. 15 is also suitable to the contents of 49 CFR 71–79.

Other documents of help in determining packaging and shipping requirements for dangerous materials are the *Bureau of Explosives Pamphlets 6, 6A, 6C and 7*. These documents provide general instructions and loading and bracing illustrations for explosives in trucks and rail cars. In addition to these pamphlets, shippers should be fully aware of appropriate local and state requirements regarding the packaging and shipment of dangerous materials. In many cases, state and local governments specify compliance with the requirements of the ICC.

Don't guess or trust packaging requirements for dangerous materials to memory. Use the regulations that exist, and be sure that your shipment will not cause death or injury to someone, or that you will not be subject to fine or imprisonment.

Those of you who are concerned with the packaging and shipment of dangerous materials should add one final procedure to your standard way of doing business. Your final act, prior to shipping dangerous materials, should be to ask yourself, "Do I want this package transported through my community or past my home?"

NOTICE

Postal regulations require the use of Zip Codes in mailing the *Defense Industry Bulletin* to United States subscribers. Please include your Zip Code when requesting subscription of the *Bulletin*.

List of BDSA Regulations, Orders and Related Actions

(As of Oct. 11, 1966)

Regulations

DMS Reg. 1 (as amended Dec. 1, 1959)	Basic Rules of the Defense Materials System.
Amendment 2 (March 15, 1966) to DMS Reg. 1.	
Dir. 1 (Dec. 1, 1959) to DMS Reg. 1.	
Dir. 2 (Dec. 1, 1959) to DMS Reg. 1.	
Dir. 3 (Dec. 1, 1959) to DMS Reg. 1.	
BDSA Reg. 1 (Oct. 1, 1953)	Ratification of Previous Actions.
BDSA Reg. 2 (as amended Mar. 23, 1953)	Basic Rules of the Priorities System.
Amendment 5 (May 9, 1958) to Reg. 2.	
Amendment 6 (Apr. 27, 1960) to Reg. 2.	
Amendment 7 (July 21, 1964) to Reg. 2.	
Amendment 8 (Feb. 23, 1966) to Reg. 2.	
Dir. 4 (as amended Apr. 30, 1952) to Reg. 2.	
Dir. 7 (June 29, 1956) to Reg. 2.	
Dir. 7, Amendment 1 (May 9, 1958) to Reg. 2.	
Dir. 8 (Jan. 18, 1957) to Reg. 2.	
BDSA Reg. 3 (as amended Feb. 1, 1956)	Operations of the Priorities and Allocations Systems between Canada and United States.
BDSA Reg. 5 (as amended Oct. 11, 1951)	Appeals.
BDSA Reg. 6 (Nov. 5, 1951)	Transfer of Quotas and Ratings; Transfer of a Business as a Going Concern.
BDSA Reg. 7 (Apr. 23, 1952)	Interpretations of BDSA (formerly NPA) Regulations and Orders.
BDSA Reg. 8 (May 15, 1956)	Compliance and Enforcement Procedures.

Orders

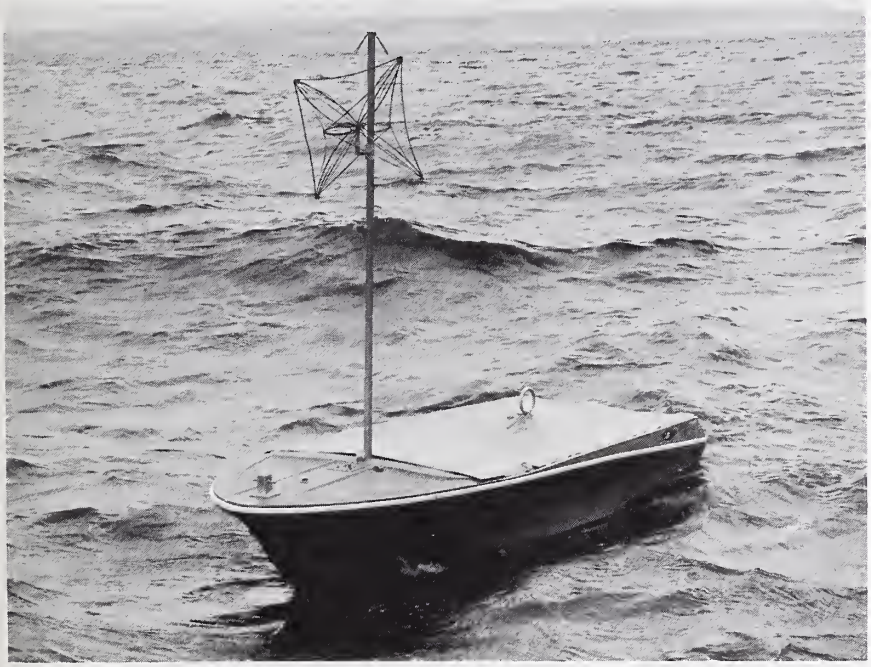
M–1A (May 14, 1953)	Iron and Steel.
Amendment 1 (June 26, 1953) to M–1A.	
Amendment 3 (Oct. 7, 1953) to M–1A.	
Amendment 4 (Jan. 20, 1958) to M–1A.	
Dir. 1 (Oct. 16, 1959) to M–1A.	
Dir. 1, Amendment 1 (Nov. 17, 1959) to M–1A.	
M–1B (June 29, 1956)	Nickel Alloys.
Amendment 1 (Aug. 17, 1956) to M–1B.	
Amendment 2 (Jan. 20, 1958) to M–1B.	
M–5A (May 6, 1953)	Aluminum.
Amendment 1 (Dec. 31, 1956) to M–5A.	
Amendment 2 (Jan. 20, 1958) to M–5A.	
M–11A (as amended Dec. 18, 1956)	Copper and Copper-base Alloys.
Amendment 1 (Jan. 20, 1958) to M–11A.	
Schedule A (Revised Aug. 15, 1966) to M–11A.	
Dir. 1 (Nov. 15, 1965) to M–11A.	
Dir. 2 (Feb. 23, 1966) to M–11A.	
Dir. 2, Amendment 2 (Aug. 15, 1966) to M–11A.	
M–17 (as amended Sept. 4, 1959)	Electronic Components or Parts.
M–41 (as amended May 24, 1963)	Metalworking Machines.
M–43A (May 6, 1953)	Construction Machinery: Distribution.

Delegations	
Del. 1 (as amended May 31, 1960)	Delegation of Authority to Secretary of Defense.
Del. 2 (as amended May 31, 1960)	Delegation of Authority to Atomic Energy Commission.
Del. 3 (May 8, 1963)	Delegation of Authority to Administrator of General Services.
Del. 9 (Feb. 26, 1951)	Secretary of Interior Delegation of Authority with Respect to Certain Industrial Chemicals Used Principally in the Petroleum Industry.
Del. 10 (Apr. 26, 1951)	Administrator of Production and Marketing Administration Delegation of Authority to Exercise Certain Functions.
Emergency Del. 1 (as amended March 23, 1962).	Emergency Delegation of Priorities and Allocation Powers.
Notice	
Notice 2 (as amended Mar. 1, 1954) Reporting Del. 2 (Oct. 11, 1966.	Signature of Official BDSA Actions.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July-Aug. 1966	July-Aug. 1965
Procurement from All Firms	$6,778,000	$4,867,500
Procurement from Small Business Firms	1,406,800	972,800
Percent Small Business	20.8	20.0



DESTINED FOR DESTRUCTION, a Firefish target boat drifts calmly off the coast of Southern California. The radio-controlled target system, ordered into production in 1964 after U. S. ships were attacked by surface craft in the Gulf of Tonkin, is used by the Navy to simulate enemy PT-boats during fleet gunnery exercises. The Firefish is 17 feet long and is built of reinforced fiberglass. It has a 120-horsepower inboard engine, can make speeds up to 30 knots and it can be controlled by surface vessels or aircraft.

Boeing Selected To Develop and Produce SRAM

The Boeing Co., Seattle, Wash., has been selected by the Air Force to develop and produce the AGM–69A Short Range Attack Missile (SRAM). It will be acquired under the Total Package Procurement Concept which calls for all development and production options to be procured in one contractual package.

The AGM–69A, an air-to-surface missile, will provide aircraft with the stand-off capability to attack heavily defended targets. It will be carried by the FB–111 bomber and will be adaptable to late model B–52 bombers.

The Boeing Co., under this firm fixed price incentive contract, will complete the development of SRAM at a target price of $142.3 million. The target price for the approved production quantity is $93.5 million.

The AGM–69A System Program Office of the Air Force System Command's Aeronautical Systems Division, Wright-Patterson AFB, Ohio, will manage development and procurement of the weapon system.

USAF Awards Contract for A-7D Attack Aircraft

The Air Force will begin procurement of the A–7D Corsair II attack aircraft under a $19,147,000 letter contract awarded Oct. 31 to LTV Aerospace Corp., Dallas, Tex. The A–7D is the Air Force version of the Navy A–7A.

First delivery of production aircraft will be in 1968, with the first wing scheduled to be operational in 1969.

The letter contract provides for specifications, plans, additional design effort, tool planning and fabrication and long leadtime material procurement. It will later be definitized under a multi-year type contract.

The A–7D will be powered by the Allison TF–41 turbofan engine which is an advanced version of the Rolls-Royce Spey engine being developed jointly by Allison at its Indianapolis, Ind., plant and by Rolls-Royce, Ltd. Production will be at the Allison plant under a licensing agreement with Rolls-Royce.

CORRECTION

The Wright Memorial Dinner will be held at the Sheraton Park Hotel, Washington, D. C., on Dec. 15 and not on Dec. 16 as listed in the Calendar of Events of the October issue of the *Bulletin*.

U.S. Department of Commerce Field Offices

Albuquerque, N. M. 87101
U. S. Courthouse
Phone: Area Code 505, 247–0311

Anchorage, Alaska 99501
306 Loussac Sogn Building
Phone: Area Code 907, 272–6331

Atlanta, Ga. 30303
4th Floor, Home Savings Building
75 Forsyth St., N.W.
Phone: Area Code 404, 526–6000

Baltimore, Md. 21202
305 U.S. Customhouse
Gay and Lombard Streets
Phone: Area Code 301, Plaza 2–8460

Birmingham, Ala. 35205
Suite 200–201, 908 South 20th St.
Phone: Area Code 205, 325–3327

Boston, Mass. 02203
Room 510, John Fitzgerald Kennedy Federal Building
Phone: Area Code 617, CA 3–2312

Buffalo, N. Y. 14203
504 Federal Building
117 Ellicott St.
Phone: Area Code 716, 842–3208

Charleston, S. C. 29403
Federal Building—Suite 631
334 Meeting St.
Phone: Area Code 803, 747–4171

Charleston, W. Va. 25301
3002 New Federal Office Building
500 Quarrier St.
Phone: Area Code 304, 343–6196

Cheyenne, Wyo. 82001
6022 Federal Building
2120 Capitol Ave.
Phone: Area Code 307, 634–5920

Chicago, Ill. 60604
1486 New Federal Building
219 South Dearborn St.
Phone: Area Code 312, 828–4400

Cincinnati, Ohio 45202
8028 Federal Office Building
550 Main St.
Phone: Area Code 513, 684–2944

Cleveland, Ohio 44101
4th Floor,
Federal Reserve Bank Building
East 6th St., and Superior Ave.
Phone: Area Code 216, 241–7900

Dallas, Tex. 75202
Room 1200, 1114 Commerce St.
Phone: Area Code 214,
RIverside 9–3287

Denver, Colo. 80202
16407 Federal Building
20th and Stout Streets
Phone: Area Code 303, 297–3246

Des Moines, Iowa 50309
1216 Paramount Building
509 Grand Ave.
Phone: Area Code 515, 284–4222

Detroit, Mich. 48226
445 Federal Building
Phone: Area Code 313, 226–6088

Greensboro, N. C. 27402
412 U.S. Post Office Building
Phone: Area Code 919, 275–9111

Hartford, Conn. 06103
18 Asylum St.
Phone: Area Code 203, 244–3530

Honolulu, Hawaii 96813
202 International Savings Building
1022 Bethel St.
Phone: 588977

Houston, Tex. 77002
5102 Federal Building
515 Rusk Ave.
Phone: Area Code 713, 228–0611

Jacksonville, Fla. 32202
512 Greenleaf Building
208 Laura St.
Phone: Area Code 904, 354–7111

Kansas City, Mo. 64106
Room 2011, 911 Walnut St.
Phone Area Code 816, FR 4–3141

Los Angeles, Calif. 90015
Room 450, Western Pacific Building
1031 South Broadway
Phone: Area Code 213, 688–2833

Memphis, Tenn. 38103
345 Federal Office Building
167 North Main St.
Phone: Area Code 901, 534–3214

Miami, Fla. 33130
928 Federal Office Building
51 S. W. First Ave.
Phone: Area Code 305, 350–5267

Milwaukee, Wis. 53203
Straus Building
238 West Wisconsin Ave.
Phone: Area Code 414, BR 2–8600

Minneapolis, Minn. 55401
306 Federal Building
110 South Fourth St.
Phone: Area Code 612, 334–2133

New Orleans, La. 70130
909 Federal Office Building, South
610 South St.
Phone: Area Code 504, 527 6546

New York, N. Y. 10001
61st Floor, Empire State Building
350 Fifth Ave.
Phone: Area Code 212,
LOngacre 3–3377

Philadelphia, Pa. 19107
Jefferson Building
1015 Chestnut St.
Phone: Area Code 215, 597–2850

Phoenix, Ariz. 85025
5413 New Federal Building
230 North First Ave.
Phone: Area Code 602, 261–3285

Pittsburgh, Pa. 15222
2201 Federal Building
1000 Liberty Ave.
Phone: Area Code 412, 644–2850

Portland, Ore. 97204
217 Old U. S. Courthouse
520 S. W. Morrison St.
Phone: Area Code 503, 226–3361

Reno, Nev. 89502
2028 Federal Building
300 Booth St.
Phone: Area Code 702, 784–5203

Richmond, Va. 23204
2105 Federal Building
400 North 8th St.
Phone: Area Code 703, 649–3611

St. Louis, Mo. 63103
2511 Federal Building
1520 Market St.
Phone: Area Code 314, MA 2–4243

Salt Lake City, Utah 84111
3235 Federal Building
125 South State St.
Phone: Area Code 801, 524–5116

San Francisco, Calif. 94102
Federal Building, Box 36013
450 Golden Gate Ave.
Phone: Area Code 415, 556–5864

Santurce, P. R. 00907
Room 628, 605 Condado Ave.
Phone: 723–4640

Savannah, Ga. 31402
235 U.S. Courthouse and Post Office Building
125–29 Bull St.
Phone: Area Code 912, 232–4321

Seattle, Wash. 98104
809 Federal Office Building
909 First Ave.
Phone: Area Code 206, 583–5615

Army Develops Lightweight Fuel Supply System

A lightweight auxiliary fuel supply system for use with permanently or semi-permanently installed engine-driven equipment is being developed by the U. S. Army Mobility Equipment Command's Engineer Research and Development Laboratories, Fort Belvoir, Va.

The 15-pound system, which can be installed in a fuel drum in only 10 minutes, features a specially designed submersible 24-volt electric pump, two and one-eighth inches in diameter and 12 inches long, with a capacity rate of 45 gallons an hour.

Equipped with 50 feet of half-inch hose, the pump may be located at various depths within the fuel container by means of a drum adapter positioned at any point on the hose. Electric leads are embedded in or threaded through the hose and connected to the engine fuel and electric system by a quick-disconnect combination coupling.

The new system is designed to eliminate vapor lock and safety hazards, to operate over a wide temperature range, and to provide flexibility in the location of auxiliary fuel drums and tanks. It may be adapted for use as a fuel transfer system or as a refueling system for mobile equipment.

Design and performance requirements for the system are contained in Military Specification MIL P–52493 (MO) and Military Standard MS 39280 (MO).

Civilian Reserve
(*Continued from Page 20*)
section does not include advising, consulting, or acting on any matter pending before any department or agency.

Responsibilities of Reserve Units.

When reservists are called up they will be assigned, in the field or in Washington, to responsibilities for which they have been trained by their units. Obviously these responsibilities vary widely in character, depending on the department or agency. Here are some examples of responsibility in the event of emergency:

Department of Agriculture. Defend crops, livestock and poultry against radiological fallout and biological and chemical warfare agents; analyze food requirements and supplies; assess attack effects on agricultural and food resources; estimate needs and claims for manpower, equipment, supplies and services.

Department of Defense. Disseminate survival instructions and other civil defense information to the public through all available media, including the Emergency Broadcasting System.

Department of Commerce. Issue priorities and directives to expedite industrial mobilization and recovery; allocate civil transportation capacity to meet essential needs; direct ocean vessel movements, allocate tonnage, requisition ships and reactivate reserve fleet ships; survey and construct vital highways; provide statistical data on manufacturers, trade and transportation.

Department of the Interior. Direct and control fuel, energy and mineral resources with state and local government participation.

Department of Labor. Subject to authorization by Congress or the President, emergency manpower registration by skill, age, physical fitness; requiring personal services necessary to meet essential survival requirements.

Federal Communication Commission. Work with appropriate resource agencies to insure availability of materials, manpower, equipment, supplies and services to support common carriers and commission licenses. Claim such resources as needed.

Interstate Commerce Commission. Allocate the use of domestic interstate surface transportation and storage to operators and users; administer priorities systems necessary to movement of essential freight and passengers.

Department of Housing and Urban Development. Direct construction, repair and management of emergency housing and related facilities; act as claimant for their material requirements.

Office of Emergency Planning. Coordinate, in behalf of the President the broad field of emergency mobilization, including the Executive Reserve and, if needed and authorized, wage and price stabilization.

Assignment of Members.

Reservists assigned to national headquarters will report to Government relocation sites in the time of an emergency mobilization. Reservists assigned to one of the eight regional Federal Emergency Centers will report to the field offices. Each center should be housed in hardened underground sites protected against nuclear attack and fallout. Certain of these sites are now in use. Others are scheduled for early completion.

Contracting for Logistic Support
(*Continued from Page 31*)
of integrated logistics management is another thrust in this direction.

Specification WR–30 is another thrust. Here we enter into contracts which call for the producer to make those parts and components he needs to keep ahead of final assembly, but at the same time make those same parts and components immediately available to us for deployment support where necessary. We have to make our withdrawal decisions in time to permit the contractor to make up more parts and components to keep his production line going under the prime contract system. But the point is, we are relying on the contractor for this material support rather than simply buying up a provisioning quantity at the outset and putting it on our shelves to hold until we need it.

Conclusion.

The sub-title to my remarks was labelled as the "Government position". It is difficult, of course, to call something a "position" unless you say I'm for it or I'm against it. The position expressed here may seem to be equivocal and ambiguous.

Let me conclude, therefore, by summarizing what the position is. We have a proven and demonstrated support system in the Military Services today. We have professionals whose lives are devoted exclusively to the methodology and techniques of supply management, maintenance management and support.

These professionals are responsive to command. And at the same time they are responsive to the demands of economy. For this latter reason, these same professionals are constantly seeking, developing and implementing new and better ways to do the support job.

Contracting for logistic support is one of the ways to which the professionals are wholly open minded. They are not only receptive, but are carefully expanding into this, the contracting approach. We are gaining in experience in this approach and, with this experience, we are refining our contractual instruments to give us progressively greater assurance that the support will be there when it is needed.

As we gain in experience and refinement, we expect to gain in contractor response and gain in confidence as well. In the final analysis, it is something like learning to ride a bicycle. It scares the kid the first time he takes off. But as he learns how to achieve and maintain his balance, and as he gains in experience, he gains in confidence as well.

Pretty soon he sails past the house and hollers, "Look Ma, no hands. . ."

That is the direction in which we are going in contractor support. But we don't want to crash in the process.

That's the Government's position, as best I can state it.

Air Force to Catalog Satellite Radar Portraits

Satellite shapes will "sit" for a gallery of electronic portraits as part of an Air Force program to develop a catalog of images of possible space vehicle shapes which can be applied to radar observation of objects orbiting the earth.

The Electronic Systems Division of the Air Force Systems Command plans to take electronic measurements of some two dozen satellite models, ranging in size from four-inches to nine-feet long.

Models are basically cylindrical and cone shaped, modified with flaring ends or rounded noses. These relatively plain shapes will also be equipped with fins, spikes representing antennae and rods running the length of the body.

The electronic portraits will be taken on the Radar Target Scatter installation of the Air Force Missile Development Center, Holloman AFB, N.M., during 2,000 hours of tests running through December. Models will be suspended in front of a radar and mechanically rotated to simulate spinning, tumbling and other movements.

DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of October 1966:

DEFENSE SUPPLY AGENCY

4—**Saddler Textiles, Inc.**, New York City, N.Y. $1,531,535. 949,000 square yds of cotton duck cloth. Defense Personnel Support Center, Philadelphia, Pa.

6—**Lester D. Lawson & Co.**, Long Beach, Calif. $1,601,397. 46,620 cases of ration supplement sundry packs. Defense Personnel Support Center, Philadelphia, Pa.

7—The Defense Personnel Support Center, Philadelphia, Pa., has issued the following contracts for black combat boots:
Gardiner Shoe Co., Gardiner, Maine. $1,493,999. 125,000 pairs.
B. B. Walker Shoe Co., Asheboro, N.C. $1,342,800. 120,000 pairs.
Brooks Shoe Mfg. Co., Hanover, Pa. $1,084,999. 84,000 pairs.
Addison Shoe Corp., Wynne, Ark. $1,480,500. 150,000 pairs.
International Shoe Co., St. Louis, Mo. $2,058,000. 200,000 pairs.
J. W. Carter, Nashville, Tenn. $3,630,000. 300,000 pairs.
Safety First Shoe Co., Nashville, Tenn. $1,770,720. 186,000 pairs.
Cumberland Shoe Co., Franklin, Tenn. $1,160,000. 100,000 pairs.
Brown Shoe Co., St. Louis, Mo. $1,796,900. 170,000 pairs.
Sportwelt Shoe Co., Nashua, N.H. $2,172,192. 200,000 pairs.

—**Endicott Johnson Corp.**, Endicott, N.Y. $1,148,268. 100,000 pairs of mildew resistant safety shoes. Endicott. Defense Personnel Support Center, Philadelphia, Pa.

—**J. P. Stevens & Co.**, New York City, N.Y. $1,195,380. 600,003 yds of wind resistant sateen cloth. New York City. Defense Personnel Support Center, Philadelphia, Pa.

10—**Flexible Tubing Corp.**, Guilford, Conn. $2,261,221. 264,780 pheumatic mattresses. Guilford. Defense Personnel Support Center, Philadelphia.

12—**Abate Clothing, Inc.**, Atlantic City, N.J. $1,940,000. 50,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

—**Wales Mfg. Co.**, Boston, Mass. $1,010,750. 25,000 men's wool gabardine overcoats. Defense Personnel Support Center, Philadelphia, Pa.

13—**Morris Bros.**, New York City, N.Y. $1,496,552. 3,000,000 cotton bath towells. Defense Personnel Support Center, Philadelphia, Pa.

18—**Republic Steel Corp.**, Chicago, Ill. $1,897,330. 183,140 spools of barbed wire (80 rods). Defense Construction Supply Center, Columbus, Ohio.

—**M. Wile & Co.**, Buffalo, N.Y. $1,226,800. 40,000 men's polyester wool tropical coats. Defense Personnel Support Center, Philadelphia, Pa.

19—**American Tent Co.**, Canton, Miss. $1,289,227. 9,700 general purpose, medium size, tent liners. Defense Personnel Support Center, Philadelphia, Pa.

—**Sun Garden Packing Co.**, San Jose, Calif. $1,094,000. 200,000 cases of No. 10 cans of tomatoes. Defense Personnel Support Center, Philadelphia, Pa.

—**E. I. DuPont de Nemours & Co.**, Wilmington, Del. $4,899,234. 109,800 rolls of aerial photographic film. Defense General Supply Center, Richmond, Va.

—**Eastman Kodak Co.**, Rochester, N.Y. $1,307,376. 100,800 rolls of aerial photographic film. Defense General Supply Center, Richmond, Va.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or work to be Performed—Location of Work Performed — Contracting Agency.

—The Defense Fuel Supply Center, Alexandria, Va., has awarded the following contracts for fuel oil and gasoline:
Gulf Oil Corp., Houston, Tex. $5,084,011;
Sinclair Refining Co., New York City, N.Y., $1,644,988 and **Hess Oil and Chemical Corp.**, Perth Amboy, N.J., $1,397,705.

20—**American Tent Co.**, Canton, Miss. $2,615,880. 12,000 general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

21—**Ethyl Corp.**, New York City, N.Y. $1,402,712. 7,000 ten-gallon drums of smoke suppressant additives. Defense General Supply Center, Richmond, Va.

—**Burlington Industries**, New York City, N.Y. $2,530,315. 2,000,000 linear yds of wind-resistant sateen cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**C. M. London Co.**, New York City, N.Y. $2,045,252. 1,348,222 linear yds of wind-resistant sateen cloth. Defense Personnel Support Center, Philadelphia, Pa.

24—**E.C.T. Corp.**, Fayetteville, N.C. $1,151,241. 360,000 pairs of men's white trousers. Defense Personnel Support Center, Philadelphia, Pa.

26—**Hart Metals, Inc.**, New York City, N.Y. $3,347,775. Magnesium powder. Defense General Supply Center, Richmond, Va.

27—**Koch Refrigerators**, Kansas City, Mo. $1,258,000. 200 refrigerators. Defense General Supply Center, Richmond, Va.

28—The Defense Personnel Support Center, Philadelphia, Pa., has awarded the following contracts for men's polyester-wool tropical coats:
Albert Turner Co., New York City, N.Y. $2,176,500. 75,000; **Bannercraft Clothing Co.**, Philadelphia, Pa., $1,881,000. 60,000; **Howard Stores Corp.**, Brooklyn, N.Y. $1,510,000. 50,000. **Raleigh Mfg., Inc.**, Baltimore, Md. $1,122,400. 40,000. **Richmond Bros., Co.**, Cleveland, Ohio. $1,001,400. 30,000.

—**La Crosse Garment Mfg. Co.**, La Crosse, Wis. $2,738,687. 190,586 regular sleeping bags and 84,448 large-size mountain sleeping bags. Defense Personnel Support Center, Philadelphia, Pa.

—**Tennessee Overall Co.**, Tullahoma, Tenn. $1,552,785. 520,000 pairs of men's polyester and wool tropical trousers. Defense Personnel Support Center, Philadelphia, Pa.

—**Robert Lawrence Co.**, Boston, Mass. $1,126,876. 37,480 men's wool serge overcoats. Defense Personnel Support Center, Philadelphia, Pa.

—**Goodstein Bros. and Co.**, New York City, N.Y. $1,615,500. 50,000 men's wool serge overcoats. Defense Personnel Support Center, Philadelphia, Pa.

31—**Peoples Co.**, Huntington, W. Va. $2,688,580. 11,428 small general purpose tents and 12,193 vestibules for small general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

—**H. Wenzel Tent & Duck Co.**, St. Louis, Mo. $1,508,826. 6,528 small general purpose tents and 5,000 vestibules for small general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

—**Mobil Oil Corp.**, New York City, N.Y. $10,424,400. 4,380,000 barrels of Navy Special Fuel Oil. Defense Fuel Supply Center, Alexandria, Va.

ARMY

3—**Donovan Construction Co.**, St. Paul, Minn. $2,639,375. 155mm high explosive projectiles. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Defense Metal Products, Inc.**, Sylacauga, Ala. $2,919,127. 155mm high explosive projectiles. Sylacauga. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Continental Motors Corp.**, Muskegon, Mich. $1,490,019. Crank shaft assemblies for combat trucks. Muskegon. Army Tank Automotive Command, Warren, Mich.

—**Menominee Engineering Corp.**, Menominee, Mich. $1,783,600. Bridge component parts. Menominee. Army Mobility Equipment Command, St. Louis, Mo.

—**General Electric**, Burlington, Vt. $7,348,423. Spare parts for the XM12 armament pod and the M61A1 automatic 20mm aircraft cannon. Burlington. Army Weapons Command, Rock Island, Ill.

5—**Halvorson-Mason**, Portland, Ore. $1,072,140. Work on the John Day Lock and Dam Project. Near The Dalles, Ore. Engineer Dist., Walla Walla, Wash.

—**Hanson Machinery Co.**, Tiffin, Ohio. $1,572,636. 5-ton cranes. Tiffin. Army Mobility Equipment Command, St. Louis, Mo.

—**Aerojet General Corp.**, Downey, Calif. $1,350,000. Metal parts for 2.75-inch rockets. Downey. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Canadian Commercial Corp.**, Ottawa, Canada. $1,141,500. Metal parts for 2.75-inch rockets. Ottawa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Morrison Knudsen Corp.**, and **Perini Corp.**, Titusville, Fla. $2,345,838. Construction work at NASA Launch Complex No. 39 at the Kennedy Space Center, Fla. Canaveral Engineer Dist., Merritt Island, Fla.

—**John F. Beasley Co.** and **Novo Industrial Corp.**, Dallas, Tex. $6,609,595. Work on the Inland Waterway, Delaware River to Chesapeake Bay, Project. Engineer Dist., Philadelphia, Pa.

7—**Motor Wheel Corp., Division of Goodyear Tire & Rubber Co.**, Lansing, Mich. $1,531,710. Road wheels for M48 tanks. Lansing. Army Tank Automotive Center, Warren, Mich.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,487,986. Track assemblies for M113 vehicles. Noblesville, Ind. Army Tank Automotive Center, Warren, Mich.

—**FMC Corp.**, Charleston, W. Va. $2,919,398. Track assemblies for M113 vehicles. Charleston. Army Tank Automotive Center, Warren, Mich.

—**Emerson Electric Co.**, St. Louis, Mo. $1,415,680. Design and development of the XM28 aircraft armament subsystem for AH-1G Huey Cobra helicopters. St. Louis. Army Weapons Command, Rock Island, Ill.

10—**United Aircraft, Sikorsky Aircraft Div.**, Stratford, Conn. $3,500,000. Items and components for the CH-54A helicopter. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—**Ford Motors**, Dearborn, Mich. $33,720,544. ¼-ton trucks. Highland Park, Mich. Project Manager, General Purpose Vehicles, Warren, Mich.

—**General Motors**, Cleveland, Ohio. $1,125,000. Production of repair parts for the M551 vehicle. Cleveland. Army Weapons Command, Rock Island, Ill.

—**Koehring Co.**, Thew Lorain Div., Lorain, Ohio. $2,347,130. Diesel engine driven, 12½-ton capacity, crane shovels. Lorain. Mobility Equipment Command, St. Louis, Mo.

11—**Philco Corp.**, Newport Beach, Calif. $2,800,000. Continued research and development on the Chaparral air defense missile system. Newport Beach. Army Missile Command, Huntsville, Ala.

—**Continental Motors Corp.**, Muskegon, Mich. $6,476,742. Engine assemblies with accessories for ¼-ton utility trucks. Muskegon. Project Manager, General Purpose Vehicles, Warren, Mich.

—**Otis Elevator Co.**, Atlanta, Ga. $1,129,338. Modification of two elevators and to furnish and install three new elevators in the vehicle assembly building at Launch Complex 39, Kennedy Space Center, Fla. Canaveral Engineer Dist., Merritt Island, Fla.

—**A. O. Smith Corp.**, Chicago, Ill. $1,348,700. Acquisition and fabrication of equipment to be installed in contractor's plant at Waco, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

13—**AVCO Corp.**, Stratford, Conn. $10,378,440. Modification kits for the T53-L13 engine. Stratford. Army Aviation Command, St. Louis, Mo.

—**General Motors**, Santa Barbara, Calif. $2,040,000. Continuation of an Advanced Research Project Agency sponsored hypervelocity range research program. Santa Barbara. Army Missile Command, Huntsville, Ala.

—**Martin K. Eby Construction Co.**, Wichita, Kan. $3,998,766. Work at the Broken Bow Dam and Reservoir Project. McCurtain Country, Okla. Engineer Dist., Tulsa, Okla.

—Goss Co., Chicago, Ill. $1,000,000. One offset press. Chicago. Army Electronics Command, Fort Monmouth, N.J.

14—Edward R. Marden Corp., Allston, Mass. $1,422,400. Construction of a Federal Regional Center for the Office of Civil Defense and Office of Emergency Planning. Maynard, Mass. New England Engineer Dist., Waltham, Mass.

—Eugene Luhr & Co., and Pine Bluff Sand & Gravel Co., Columbia, Ill. $1,932,133. Construction work on the Arkansas River and Tributaries Lock and Dam Project. Dumas, Ark. Engineer Dist., Little Rock, Ark.

—Dunbar & Sullivan Dredging Co., Detroit, Mich. $1,382,000. Dredging and excavation work at the Cordell Hull Project. Carthage Tenn. Engineer Dist., Nashville, Tenn.

—RCA, Camden, N.J. $1,386,937. Portable radio sets. Camden. Army Electronics Command, Philadelphia, Pa.

—Hughes Aircraft, Culver City, Calif. $3,917,972. FY 1967 TOW missile research & development. Culver City. Army Missile Command, Huntsville, Ala.

—American Machine & Foundry Co., Brooklyn, N.Y. $2,322,763. Production facilities for bomb components. Brooklyn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—A. O. Smith Corp., Chicago, Ill. $8,473,009. Metal parts for 750-pound bombs. East Chicago, Ind., Dangerfield, Tex. and Waco, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Magnavox Co., Fort Wayne, Ind. $3,000,000. Radio communication sets. Fort Wayne. Army Electronics Command, Fort Monmouth, N.J.

17—Price Bros. Co., Dayton, Ohio. $1,978,920. Construction and maintenance dredging work at the Green Bay Harbor, Wis., Project. Engineer Dist., Chicago, Ill.

—Barber-Green Co., Aurora, Ill. $2,465,990. Ten diesel engine driven, asphalt mixing plants. Aurora. Army Mobility Equipment Command, St. Louis, Mo.

—Coleman Bros, Inc., Readville, Mass. $1,071,205. (NASA funds). Construction of foundations for a high rise lab-administration building, a microwave lab; an auditorium-cafeteria building and a utility support building at the NASA Electronic Research Center, Cambridge, Mass. New England Engineer Dist., Waltham, Mass.

18—Peter Kiewit Sons' Co. and Chris Berg, Inc., Omaha, Neb. $4,466,000. Construction of an unlined tunnel for a POL (petroleum, oils and lubricants) pipeline being installed between Whittier and Anchorage, Alaska. Engineer Dist., Anchorage, Alaska.

—Chrysler Corp., Warren, Mich. $1,467,321. Booster adapters for bombs. Warren. Procurement Detachment, Chicago, Ill.

—Basalt Rock Co., Napa, Calif. $1,031,791. Work on the Sacramento River bank protection project. Between Rio Vista and Sacramento, Calif. Engineer Dist., Sacramento, Calif.

19—Holston Defense Corp., Kingsport, Tenn. $2,668,390. Various explosives and operation and maintenance activities at the Holston Army Ammunition Plant, Kingsport, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Appalachian Power Co., New York City, N.Y. $1,522,197. Operation of the Government owned power plant at the Army Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Atlas Chemical Industries, Wilmington, Del. $7,107,879. TNT and for operation and maintenance activities at the Volunteer Army Ammunition Plant, Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Hamilton Watch Co., Lancaster, Pa. $1,798,651. Rocket fuzes. Lancaster. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Ajax Hardware Corp., City of Industry, Calif. $3,018,000. Fuzes for 81mm mortar shells. City of Industry, Ammunition Procurement & Supply Agency, Joliet, Ill.

—L. G. Barcus & Sons, Kansas City, Kan. $1,351,206. Work on the Des Moines, Iowa, local flood protection project. Des Moines. Engineer Dist., Rock Island, Ill.

—Chrysler Motors, Detroit, Mich. $2,071,999. M601 vehicles (one-ton power wagons). Detroit. Army Tank Automotive Command, Warren, Mich.

20—AVCO Corp., Stratford, Conn. $4,273,320. T55–L–7 engines for CH–47 helicopters. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—Mohawk Rubber Co., Akron, Ohio. $1,106,000. Pneumatic tires, 1100x20, 12 ply, truck and bus, for the six-ton wrecker. Akron. Army Tank Automotive Command, Warren, Mich.

—U.S. Rubber & Tire Co., Detroit, Mich. $1,815,447. Pneumatic tires, 1100x20, 12 ply, truck and bus for the six-ton wrecker. Los Angeles, Calif. Army Tank Automotive Command, Warren, Mich.

—Union Carbide Corp., New York City, N.Y. $1,580,922. Batteries for AN/PRC–25 radio sets. Cleveland, Ohio. Army Electronics Command, Philadelphia, Pa.

—RCA, Camden, N.J. $1,529,450. Compact lightweight radio sets, AN/GRC–50, for ground stations. Camden. Army Electronics Command, Philadelphia, Pa.

—General Electric, Burlington, Vt. $2,155,320. Repair parts for 7.62mm aircraft guns. Burlington. Army Weapons Command, Rock Island, Ill.

—Martin Marietta Corp., Orlando, Fla. $3,000,000. Exploratory development of selected Pershing components. Orlando. Army Missile Command, Huntsville, Ala.

21—Wittronics Mfg., Inc., Boyertown, Pa. $1,156,464. Fuzes (M423) for 2.75 inch rockets. Boyertown. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Chrysler Motors, Detroit, Mich. $1,135,485. Engine assemblies for ¾-ton trucks. Marysville, Mich. Army Tank Automotive Center, Warren, Mich.

—Norris Thermador Corp., Los Angeles, Calif. $1,330,947. Procurement of new production equipment and reactivation of existing equipment at the Army Ammunition Plant, Riverbank, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Sperry Rand Corp., New York City, N.Y. $9,637,599. Explosives and for operation and maintenance activities at the Louisiana Army Ammunition Plant, Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

24—General Motors, Detroit, Mich. $1,196,821. 25 ampere regulations for ¼-ton, ¾-ton and 2½-ton trucks. Anderson, Ind. Army Tank Automotive Command, Warren, Mich.

—General Tire & Rubber Co., Akron, Ohio. $2,843,740. 7.62mm rifle stock assemblies. Marion, Ind. Springfield Armory, Springfield, Mass.

—Batesville Mfg. Co., Batesville, Ark. $4,083,460. Metal parts for the CBU 14A/A canister bomb unit. Batesville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—ACF Industries, St. Louis, Mo. $4,087,241. Metal parts for the CBU 14A/A canister bomb unit. St. Louis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Scovill Mfg. Co., Waterbury, Conn. $4,171,813. Metal parts for the CBU 14A/A canister bomb unit. Waterbury, Conn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—National Lead Co., Toledo, Ohio. $1,514,699. Body assemblies for the CBU 14A/A canister bomb unit. Toledo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—National Lead Co., Pottstown, Pa. $1,427,318. Body assemblies for the CBU 14A/A canister bomb unit. Pottstown. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Honeywell, Inc., Hopkins, Minn. $1,407,356. Body assemblies for the CBU 14A/A canister bomb unit. Hopkins. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Bulova Watch Co., Jackson Heights, N.Y. $1,995,752. 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Fairchild Camera and Instrument Corp., Long Island, N.Y. $1,341,000. 2.75-inch rocket fuzes. Long Island. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Time Corp., Stamford, Conn. $1,152,360. 2.75-inch rocket fuzes. Stamford. Ammunition Procurement & Supply Agency, Joliet, Ill.

25—Martin-Marietta Corp., Orlando, Fla. $1,000,000. Exploratory development of selected Pershing components. Orlando. Army Missile Command, Huntsville, Ala.

—Saco-Lowell, Northeast Div., Maremont Corp., Saco, Maine. $1,964,098. Barrels for the 20mm, M61 and M61A1 Gatling Gun (Vulcan); and 1 set of final inspection equipment for the above barrels for use on aircraft machine guns. Saco. Army Weapons Command, Rock Island, Ill.

—Martin-Marietta Corp., Orlando, Fla. $14,600,000. Research and development of improved Pershing ground support equipment. Orlando. Army Missile Command, Huntsville, Ala.

26—Hercules, Inc., Wilmington, Del. $5,392,600. Propellants, explosives and O&MA activities. Army Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Mason & Hanger, Silas Mason Co., New York City, N.Y. $17,644,304. Loading, assembling and packing of artillery ammunition. Army Ammunition Plant, Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—U.S. Rubber Co., New York City, N.Y. $50,756,302. Ammunition, explosives and O&MA activities. Army Ammunition Plant, Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

27—Clark Equipment Co., Benton Harbor, Mich. $6,303,202. Industrial tractors. Benton Harbor. Army Mobility Equipment Command, St. Louis, Mo.

—American Cystoscope Makers, Inc., Pelham Manor, N.Y. $2,445,458. Telescopes, telescope equipment and hanger assemblies. Bronx, N.Y. Frankford Arsenal, Pa.

—Bell Helicopter Co., Fort Worth, Tex. $3,046,248. Main rotor hub assemblies for UH–1 aircraft. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

—Bell Helicpoter Co., Fort Worth, Tex. $1,021,623. Gear box assemblies for UH–1 aircraft. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

—Hughes Aircraft, Fullerton, Calif. $1,750,000. Modernization program of the AN/TSQ–57 Fire Distribution System for the Marine Corps. Fullerton. Southwest Procurement Agency, Pasadena, Calif.

—Philco Corp., Philadelphia, Pa. $1,500,000. A voice access system and ancillary items. Willow Grove, and Philadelphia, Pa. Army Electronics Command, Fort Monmouth, N.J.

—Aerojet General Corp., Downey, Calif. $3,105,512. Cluster bombs. Camden, Ark. Edgewood Arsenal, Md.

28—A. G. Schoomaker Co., Sausalito, Calif. $1,198,193. Construction of the Meck Island land based power plant. Engineer Dist., Honolulu, Hawaii.

—Rohm & Hass Co., Philadelphia, Pa. $2,500,000. Propellant research program for one year. Huntsville, Ala. Army Missile Command, Huntsville, Ala.

—American Machine & Foundry Co., Brooklyn, N.Y. $3,351,841. Metal parts for 750-lb. bombs. Garden City, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Kennedy Van Saun Corp., Danville, Pa. $2,377,120. Metal parts for practice projectiles for the M60 tank. Danville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Aerojet General Corp., Downey, Calif. $1,629,900. Compontnts for bomb dispensers. Downey. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Avco Corp., Stratford, Conn. $7,153,000. T–53–L–15 aircraft engines for UH–1D helicopters. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—Avco Corp., Stratford, Conn. $2,400,000. T–53–L–15 turbine aircraft engines for the OV–1 aircraft (Mohawk); and T–53–L–11 engines for the UH–1E aircraft. Stratford. Army Aviation Materiel Command, St. Louis, Mo.

—Martin-Marietta Corp., Orlando, Fla. $1,690,928. Continued installation of modification kits in support of the Pershing weapons system. Orlando. Army Missile Command, Huntsville, Ala.

31—Hercules, Inc., Wilmington, Del. $7,213,425. 2.75-inch rocket propellant and O&MA activities. Sunflower Army Ammunition Plant, Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Scovill Mfg. Co., Waterbury, Conn. $1,727,765. Metal parts for bombs. Waterbury. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Merz Engineering Co., Indianapolis, Ind. $1,689,300. Bomb dispensers. Indianapolis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Honeywell, Inc., Hopkins, Minn. $1,315,280. Facilities necessary to expand production capability for fuzes and bomb cluster units. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Merz Engineering Co., Indianapolis, Ind. $1,706,639. Bomb dispensers and miscellaneous ancillary items. Indianapolis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—Aerojet General, Downey, Calif. $1,610,162. Bomb dispensers and miscellaneous ancil-

lary items. Downey. Ammunition Procurement & Supply Agency, Joliet, Ill.

—General Motors, Detroit, Mich. $1,518,941. Diesel engines for the M113 family of vehicles. Detroit. Army Tank Automotive Center, Warren, Mich.

—General Motors, Indianapolis, Ind. $3,569,-198. Transmissions for the M551 General Sheridan tank. Indianapolis. Army Tank Automotive Center, Warren, Mich.

—Bowen McLaughlin York, York, Pa. $3,-952,410. Self-propelled 8-inch howitzers and recovery vehicles. Bair, Pa. Army Tank Automotive Center, Warren, Mich.

—FMC Corp., San Jose, Calif. $29,357,230. Armored personnel carriers, and cargo carriers. South Charleston, W. Va. Army Tank Automotive Center, Warren, Mich.

—Honeywell, Inc., Tampa, Fla. $2,500,000. Classified electronic equipment. Tampa. Army Electronics Command, Fort Monmouth, N.J.

—Collins Radio Co., Richardson, Tex. $3,-213,694. Radio terminal sets. Dallas, Tex. Army Electronics Command, Fort Monmouth, N.J.

—Magnavox Co., Fort Wayne, Ind. $1,705,-071. Components of vehicular communication sets. Fort Wayne. Army Electronics Command, Fort Monmouth, N.J.

—General Electric, West Lynn, Mass. $2,-350,000. T–64–GE engines for the advanced aerial fire support system. West Lynn. Army Aviation Materiel Command, St. Louis, Mo.

—United Aircraft, Pratt & Whitney Aircraft Div., East Hartford, Conn. $17,242,932. Engines for the CH–54A aircraft (Flying Crane). East Hartford. Army Aviation Materiel Command, St. Louis, Mo.

—Watervliet Arsenal, N.Y. $5,417,430. 175mm cannons and barrel assemblies. Watervliet, N.Y. Army Weapons Command, Rock Island, Ill.

NAVY

3—Lockheed Missiles & Space Co., Sunnyvale, Calif. $29,261,444. Engineering services in support of the Polaris program. Sunnyvale. Special Project Office.

—Defoe Shipbuilding Co., Bay City, Mich. $11,764,280. Construction of two oceanographic research ships. Bay City. Naval Ship Systems Command.

—Bethlehem Steel Corp., Baltimore, Md. $1,-325,000. Overhaul of the landing ship, dock, USS CASA GRANDE (LSD–13). Baltimore. Industrial Manager, 5th Naval Dist.

—Sanders Associates, Inc., Nashua, N.H. $16,071,000. Classified electronic equipment. Nashua. Naval Air Systems Command.

4—United Aircraft, East Hartford, Conn. $1,607,794. Spare parts for engines for F–9F and F–8A aircraft. $9,979,987. Spare parts for TF–30–P6 engines for A–7A aircraft. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

—General Dynamics Corp., Pomona, Calif. $3,727,166. Research and development of a new dual thrust rocket motor for the Standard missile. Pomona. Naval Ordnance Systems Command.

—Texas Instrument, Inc., Dallas, Tex. $2,-477,024. Components for the AN/AAPQ–116 radar system. Dallas. Naval Supply Systems Command.

6—LTV Aerospace Corp., Dallas, Tex. $18,-000,000. Services and materials to extend the service life and incorporate improvement changes in F8D aircraft. Dallas. Naval Air Systems Command.

—Alsco, Inc., St. Louis, Mo. $4,491,686. Rocket launchers. St. Louis. Naval Air Systems Command.

—General Dynamics, San Diego, Calif. $3,-000,000. Tracking radar modifications. San Diego. Naval Air Systems Command.

—Norris Industries, Los Angeles, Calif. $1,-200.140. Motor tubes for the Sidewinder and Chaparral missiles. Los Angeles. Naval Ordnance Plant, Indian Head, Md.

—General Dynamics, Pomona, Calif. $3,000,-000. Procurement and/or fabrication of long lead time parts and assemblies required for improvements in the Terrier/Tartar missile systems. Pomona. Naval Ordnance Systems Command.

7—United Aircraft, East Hartford, Conn. $22,-428,800. TF–30–P–3 engines for the Air Force. East Hartford. Naval Air Systems Command.

—Lockheed Missiles & Space Co., Sunnyvale, Calif. $10,316,250. Classified services on the Polaris program. Sunnyvale. Special Projects Office.

10—Sperry Rand Corp., Syosset, L.I., N.Y. $3,900,000. Instrument and control subsystems for the NR–1 vehicle. Syosset. Special Projects Office.

—United Aircraft, East Hartford, Conn. $3,203,400. TF–30–P–3 engines for the Air Force. East Hartford. Naval Air Systems Command.

—Columbia University, New York City, N.Y. $3,200,000. Research in acoustic detection. Dobbs Ferry, N.Y. Office of Naval Research, Washington, D.C.

—Jacksonville Shipyards, Charlestown, S.C. $1,526,000. Regular overhaul of the ammunition ship USS Wrangell (AE–12). Charleston. Industrial Manager, 6th Naval Dist.

12—United Aircraft, East Hartford, Conn. $5,-706,092. J52–P–8A engines. East Hartford. Naval Air Systems Command.

—General Electric, Cincinnati, Ohio. $1,604,-786. Spare parts for J79–GE–8 engines. Cincinnati. Navy Aviation Supply Office, Philadelphia, Pa.

13—Hughes Aircraft, Fullerton, Calif. $2,136,-636. Automatic Track-While-Scanning Radar System for the Barking Sands Missile Range at Kauai, Hawaii. Navy Purchasing Office, Washington, D.C.

—Kollmorgen Corp., Northampton, Mass. $1,820,700. Design, development and evaluation of a prototype periscope system for submarines. Northampton. Naval Ship Systems Command.

—General Electric, Cincinnati, Ohio. $4,989,-364. Design, development and evaluation of a prototype periscope system for submarines. Cincinnati. Naval Ship Systems Command.

—Itek Corp., Lexington, Mass. $1,918,665. Design, development and evaluation of a prototype periscope system for submarines. Burlington, Mass. Naval Ship Systems Command.

14—Litton Systems, Van Vuys, Calif. $3,529,-253. Spare parts for the AN/ASA–27 computer system for E–2A aircraft. Van Nuys. Naval Aviation Supply Office, Philadelphia, Pa.

17—Food Machinery Corp., Minneapolis, Minn. $3,832,000. Design & development of the 175mm, 60-cal. gun mount (Mk 1 Mod 00). Fridley, Minn. Naval Ordnance Systems Command.

—Akwa Downey Construction Co., Santa Barbara, Calif. $2,590,000. Construction of barracks at the Naval Training Center, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command.

—Todd Shipyards, Brooklyn, N.Y. $1,127,926. Topside overhaul of the attack transport USS Monrovia (APA–31). Brooklyn. Industrial Manager, 5th Naval Dist.

—North American Aviation, Columbus, Ohio. $60,427,810. OV–10A aircraft for the Marine Corps and Air Force, plus long lead time effort for additional aircraft for the Marine Corps. Columbus. Naval Air Systems Command.

18—General Electric, West Lynn, Mass. $1,-347,210. Spare parts for T58–GE–8B helicopter engines. West Lynn. Navy Aviation Supply Office, Philadelphia, Pa.

—Standard Products Co., Cleveland, Ohio. $3,258,428. Track section repair kits for amphibious landing vehicles (LVTP–5). Port Clinton, Ohio. Marine Corps.

19—McDonnell Aircraft, St. Louis. $65,000,000. F–4J aircraft. St. Louis. Naval Air Systems Command.

—Bethlehem Steel Co., Baltimore, Md. $1,-186,557. Overhaul of the oiler USS Chikaskia (AO–54). Baltimore. Industrial Manager, 5th Naval Dist.

20—Westinghouse Electric Corp., Baltimore, Md. $66,379,000. Airborne radar receiver sets. Baltimore. Naval Air Systems Command.

—Douglas Aircraft, Long Beach, Calif. $31,-500,000. Increased long lead time effort for [illegible] aircraft. Long Beach. Naval Air Systems Command.

—United Aircraft, East Hartford, Conn. $14,469,019. J52–P–8A aircraft engines. East Hartford. Naval Air Systems Command.

—Pacific Coast Engineering Co., Alameda, Calif. $3,126,000. Construction of 6 cargo craft. Alameda. Naval Ship Systems Command.

—Todd Shipyards, Brooklyn, N.Y. $1,-132,163. Repairs, drydocking and installation of position keeping propulsion pods on the USNS Mission Capistrano (T–AG 162). Brooklyn. Military Sea Transportation Service, Atlantic Area.

21—Raytheon Co., Bedford, Mass. $10,642,822. Research and development on the Sparrow guided missile. Bedford. Naval Air Systems Command.

—Intercontinental Mfg. Co. Garland, Tex. $5,244,000. Bomb bodies. Garland. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—American Machine & Foundry Co., York, Pa. $6,849,750. Bomb bodies. York. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—Todd Shipyards, Seattle, Wash. $1,149,098. Regular overhaul of the attack transport USS Pickaway (APA–222). Seattle. Industrial Manager, 13tb Naval Dist.

24—Levingston Shipbuilding Co., Orange, Tex. $8,587,000. Construction of two patrol escort (PF) vessels. Orange. Naval Ship Systems Command.

—Farmers Tool & Supply Corp., Denver, Colo. $1,873,274. Wing and rolleron assemblies for the Sidewinder 1C and Chaparral missiles. Indian Head, Md. Naval Propellant Plant, Indian Head, Md.

—Gunderson Bros. Engineering Corp., Portland, Ore. $4,259,145. Assault support patrol boats (ASPB). Portland. Naval Ship Systems Command.

25—Jacksonville Shipyards, Jacksonville, Fla. $1,250,000. Topside repair and alteration of the attack aircraft carrier USS Saratoga (CVA–60). Jacksonville. Industrial Manager, 6th Naval Dist.

—Todd Shipyards, San Pedro, Calif. $1,432,-636. Drydocking, alteration and repair of the attack cargo ship USS Skagit (AKA–105). San Pedro. Industrial Manager, 11tb Naval Dist.

—M.I.T., Cambridge, Mass. $7,425,000. Design, development and testing of the Poseidon missile guidance system. Cambridge. Special Projects Office.

—United Aircraft, Pratt & Whitney Aircraft Div., East Hartford, Conn. $13,857,652. J52–P–8A engines. East Hartford. Naval Air Systems Command.

26—National Steel & Shipbuilding Co., San Diego, Calif. $1,797,556. Regular overhaul of the attack transport USS Paul Revere (APA–248). San Diego. Industrial Manager, 11th Naval Dist.

—Douglas Aircraft, Long Beach, Calif. $2,-312,698. Bomb racks and adapter kits. Torrance, Calif. Naval Air Systems Command.

—Bendix Corp., Mishawaka, Ind. $15,096,-287. Talos guidance, control and airframe development. Mishawaka. Naval Ordnance Systems Command.

—United Aircraft, Pratt & Whitney Aircraft Div., East Hartford, Conn. $2,159,782. Spare parts to support engines on F9F, F8, A3, A4 and A6 aircraft. East Hartford. Naval Aviation Supply Office, Philadelphia, Pa.

27—Philco-Ford Corp., Aeronutronic Div., Newport Beach, Calif. $1,524,400. Armorplate for Navy boats. Newport Beach. Naval Ship Systems Command.

—Royal Industries, Engineered Products Div., Alhambra, Calif. $1,808,439. External auxiliary fuel tanks. Alhambra. Naval Air Systems Command.

28—A. C. Ball Co., San Carlos, Calif. $1,168,-196. Production of road wheel assemblies for Marine Corps amphibian tractors (LVTP–5). San Carlos. Marine Corps Supply Company, Philadelphia, Pa.

—United Aircraft, Sikorsky Aircraft Div., Stratford, Conn. $1,500,000. Increased long lead time effort and materials for HH–53B helicopters for the Air Force. Stratford. Naval Air Systems Command.

—Bendix Corp., Eclipse-Pioneer Div., Teterboro, N.J. $6,392,332. Spare parts used in support of the PB20 automatic flight control system on attack aircraft. Teterboro, N.J. and North Hollywood, Calif. Naval Aviation Supply Office, Philadelphia, Pa.

31—General Electric, Washington, D.C. $2,-550,000. Reconditioning of 24 Government furnished turbine-generator sets, including voltage-regulation systems and spare parts. Fitchburg, Mass. Naval Ship Systems Command.

—Garrett Corp., AiResearch Mfg. Co., Los Angeles, Calif. $1,902,958. Compressor power units and related equipment. Torrance, Calif. Naval Air Systems Command.

—Curtiss Wright Corp., Wright Aeronautical Div., Wood-Ridge, N.J. $3,930,025. Spare parts to support J65W16 engines for various aircraft. Wood-Ridge. Naval Aviation Supply Office, Philadelphia, Pa.

—Collins Radio Co., Cedar Rapids, Iowa. $2,930,373. Design, development, fabrica-

tion, assembly and testing of a buoy subsystem. Cedar Rapids, Newport, Beach, Calif. and Richardson, Tex. Naval Ordnance Laboratory, Silver Spring, Md.

—Sperry Rand Corp., Univac Div., St. Paul, Minn. $1,777,500. Avionics computers. St. Paul. Naval Air Systems Command.

—Huyck Corp., Huntington Station, N.Y. $1,918,400 Ships' plotting systems. Huntington Station. Naval Ship Systems Command.

—LTV Aerospace Corp., Aeronautics Div., Dallas, Tex. $19,147,000. Non-recurring effort and long lead time material and effort in preparation for production of A7D aircraft for the Air Force. Dallas. Naval Air Systems Command.

AIR FORCE

3—Raytheon Co., Waltham, Mass. $1,035,000. Electron tubes. Waltham. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Atlantic Research Corp., Saugas, Calif. $3,391,542. Aircraft flares. Saugus, Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—North American Aviation, Anaheim, Calif. $1,361,611. Spare parts for the Minuteman weapon system. Anaheim. Odgen Air Materiel Area, (AFLC), Hill AFB, Utah.

4—Walter Kidde & Co., Burbank, Calif. $1,-965,114. Modification of the personnel escape system of the F–102 aircraft. Burbank. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—AVCO Corp., Everett, Mass. $1,060,000. Work on a research program. Everett. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—United Aircraft, East Hartford, Conn. $2,287,267. Spare parts for J–57 aircraft engines. East Hartford. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

5—Olin Mathieson Chemical Corp., New York City, N.Y. $2,553,234. Production of fuel for TITAN missiles. Saltville, Va. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—Consolidated Diesel Electric Co., Stamford, Conn. $1,764,259. Production of elcctrical generators and related equipment. Stockton, Calif. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Goodyear Aerospace Corp., Akron, Ohio. $6,650,000. Production of air transportable photographic laboratories. Akron. Aeronautical Systems Div. (AFSC), Wright-Patterson AFB, Ohio.

—Sperry Rand Corp., Charlottesville, Va. $1,770,504. Production of airborne radar for C–130 and C–141 aircraft. Charlottesville, Va. Aeronautical Systems Div., (AFSC), Wrigbt-Patterson AFB, Ohio.

—Technical Measurement Corp., Santa Ana, Calif. $1,095,740. Production of telemetry display systems. Santa Ana. Air Force Western Test Range, Vandenberg AFB, Calif.

—Sargent Fletcher Co., El Monte, Calif. $7,814,815. Production of aircraft bombs. La Habra, Calif. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—United Aircraft, East Hartford, Conn. $2,822,692. Production of spare parts for J–57 aircraft engines. East Hartford. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—Fairchild Hiller Corp., Hagerstown, Md. $1,424,192. Production of aircraft fuel tank and ordnance pylon assemblies. Hagerstown. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—General Motors, Indianapolis, Ind. $1,837,-626. Aircraft engine development work. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Continental Aviation and Engineering Corp., Detroit, Mich. $2,616,948. Production of J–69 aircraft engines. Toledo, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Westinghouse Electric Corp., Baltimore, Md. $1,865,968. Production of communications equipment. Baltimore. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

6—Microwave Dynamics Corp., Mesa, Ariz. $1,500,000. Production of aircraft engine starter cartridges. Mesa. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

10—General Electric, Philadelphia, Pa. $6,-900,000. Mark 12 penetration aids system. Philadelphia. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Hughes Aircraft, Culver City, Calif. $3,-756,125. Production of modification kits and engineering services for Tactical Air Communications and Navigation (TACAN) systems. Los Angeles, Calif. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Continental Aviation & Engineering Corp., Detroit, Mich. $1,485,920. Production of J–69 engines for T–37 aircraft. Toledo, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Cornell Aeronautical Laboratory, Buffalo, N.Y. $1,000,000. Analysis and evaluation of penetration aids. Buffalo. Systems Engineering Group, (AFSC), Wright-Patterson AFB, Ohio.

11—General Motors, Indianapolis, Ind. $2,-276,528. Component improvement program for the T–56 aircraft engine. Indianapolis. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Lockheed Aircraft, Marietta, Ga. $2,000,000. Production of HC–130 aircraft. Marietta. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Wilcox Electric Co., Kansas City, Mo. $2,-476,800. Production of aircraft communications equipment. Kansas City. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

12—Westinghouse Electric, Baltimore, Md. $1,-563,821. Production of communication equipment. Baltimore. Oklaboma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—Sperry Rand Corp., Univac Div., Washington, D.C. $2,522,040. Purchase of computer systems. Utica, N.Y. 2750th Air Base Wing, Wright-Patterson AFB, Ohio.

—Bendix Corp., South Bend, Ind. $1,227,-345. Hydraulic assemblies for F–105 aircraft. South Bend. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—Curtiss-Wright Corp., East Peterson, N.J. $3,413,352. Production of a C–141 flight simulation trainer and related equipment. Paterson. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

13—Fairchild Hiller Corp., Bayshore, L.I., N.Y. $1,077,619. Production of environmental control systems for F–4, F–111 and F–105 aircraft. Bayshore. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

14—Aerojet-General Corp., Sacramento, Calif. $35,337,535. Production of Stage II Minuteman missile motors. Sacramento. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

17—Lear Siegler, Inc., Grand Rapids, Mich. $1,353,789. Aircraft bombing computers. Grand Rapids. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—United Aircraft, East Hartford, Conn. $1,123,536. Spare parts for R–4360 reciprocating aircraft engines. East Hartford. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

19—General Electric, Philadelphia, Pa. $5,-699,971. Research and development on MARK 12 re-entry programs. Philadelphia. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Sargent-Fletcher Co., El Monte, Calif. $1,-070,920. Production of aircraft bombs. La Habra, Calif. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—A. G. Schoomaker Co., Sausalito, Calif. $1,379,817. Production of heavy duty electrical generators. Sausalito. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—General Electric, West Lynn, Mass. $1,-752,000. Production of J85–GE–13 engines for F–5A aircraft. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

20—B. F. Goodrich Co., Akron, Ohio. $1,095,-730. Production of wheel assemblies for B–52 aircraft. Troy, Ohio. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—North American Aviation, Anabeim, Calif. $1,660,000. Maintenance and modification of Minuteman missile guidance and control equipment. Anaheim. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—American Electric, Inc., Paramount, Calif. $7,408,220. Production of aircraft bombs. Pittsburg and El Cajon, Calif. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—General Electric, Evendale, Ohio. $4,861,-360. Facilities expansion in support of the J–79 engine program. Evendale. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

21—Crane Co., Burbank, Calif. $1,790,000. Production of modification kits for the C–130 aircraft anti-skid brake system. Burbank. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

24—Sperry Rand Corp., Great Neck, N.Y. $1,-125,000. Ground support equipment for airborne LORAN navigational sets. Great Neck. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Thiokol Chemical Corp., Brigham, Utah. $1,075,507. Design, fabrication and testing of a thrust vector control system for a 156-inch solid rocket motor. Brigham. Air Force Flight Test Center, Edwards AFB, Calif.

25—L. T. Industries, Inc., Dallas, Tex. $3,230,-496. Production of aircraft bomblet dispensers. Dallas. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—North American Aviation, Los Angeles, Calif. $1,513,800. Production of radar equipment for F–100 aircraft. Los Angeles. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Martin-Marietta Corp., Denver, Colo. $2,-637,017. Production of spare parts for the Titan III missile system. Waterton, Colo. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

26—Hughes Aircraft, Culver City, Calif. $2,-000,000. Training equipment and data related to the Falcon air-to-air missile. Culver City. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Continental Aviation & Engineering Corp., Detroit, Mich. $1,484,001. Production of J–69 engines for Army helicopters. Toledo, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—General Electric, West Lynn, Mass. $1,-192,618. Spare parts for the B–52 hydraulic system. West Lynn. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—Columbia University, New York City, N.Y. $4,802,249. Studies of sensors applicable to ICBM trajectory. New York City. Air Force Office of Scientific Research.

27—Collins Pipe, Inc., and the Narwais Steel Co., Richmond, Va. $1,641,686. Production of metal revetments for aircraft protection. Richmond. Aeronautical Systems Div., (AFSC), Wrigbt-Patterson AFB, Ohio.

—Batesville Mfg. Co., Camden, Ark. $2,-136,000. Production of dispensers for bomblets. Camden. Aeronautical Systems Div., (AFSC), Wrigbt-Patterson AFB, Ohio.

—Dell Industries, Waycross, Ga. $1,278,355. Production of practice bombs. Waycross. Ogden Air Materiel Area, (AFLC), Hill AFB, Ga.

—Fairchild Hiller Corp., St. Augustine, Fla. $3,622,175. Inspection and repair of C–130, HC–130 and WC–130 aircraft. St. Petersburg, Fla. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—Systems Development Corp., Santa Monica, Calif. $2,000,000. Procurement of satellite control computer systems. Santa Monica. Air Force Satellite Control Facility, Los Angeles, Calif.

28—North American Aviation, Los Angeles, Calif. $4,711,114. Procurement of pylon assemblies for F–100 aircraft. Los Angeles. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—Sperry Rand Corp., Washington, D.C. $4,-200,555. Production of computer systems. Utica, N.Y. Wrigbt-Patterson AFB, Ohio.

31—Boeing Co., Seattle, Wasb. $5,500,000. Modification and updating of the Minuteman missile system. Cheyenne, Wyo.; Rapid City, S.D.; and Minot, N.D. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—Systems Development Corp., Santa Monica, Calif. $4,055,000. Computer programming services for the Air Defense system. Santa Monica. Electronics Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—Texas Instruments, Inc., Dallas, Tex. $1,-065,300. Production of spare parts for RF–4C aircraft. Dallas. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—Space Corp., Dallas, Tex. $1,579,087. Production of jet engine test stands. Garland, Tex. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

University of Colorado Scientists To Investigate UFO Reports

The University of Colorado, Boulder, Colo., has been selected by the U. S. Air Force to conduct independent investigations into unidentified flying object (UFO) reports.

A research agreement, valued at approximately $300,000, is being negotiated with the university by the Air Force Office of Scientific Research to analyze phenomena associated with UFO sightings and to make recommendations on the Air Force's methods of investigating and evaluating UFO reports—a program known as Project Blue Book. A report is expected to be made to the Air Force in early 1968.

Dr. Edward U. Condon will direct the scientific phases of the work and Robert J. Low will serve as project coordinator. Principal investigators working with Dr. Condon will be Dr. Franklin E. Roach and Dr. Stuart W. Cook.

Colorado is expected to select several other universities to take part in the research. These and other consultants will bring the number of scientists involved to over 100.

The National Academy of Sciences has indicated its willingness to assist by appointing a panel—at the time the Colorado report becomes available to the Air Force—to review the investigating team's work. This panel will not be part of the investigating team, but will provide a further independent check on the scientific validity of the method of investigation.

Air Force Project Blue Book files, as well as any other UFO information in the possession of the Air Force, will be made available to the University of Colorado team. In addition, all Air Force installations within the United States will assist the team, if requested. The investigators will, however, conduct their research independently of and without direction from the Air Force.

The decision to enter into a research agreement for this work was based on a recommendation of the Air Force Scientific Advisory Board which completed a review of the resources, methods and findings of Project Blue Book earlier this year. The board recommended that the program be expanded to include investigation of selected sightings by independent scientists.

Within the Defense Department, the Air Force has the responsibility of investigating UFO reports in its role of air defense of the United States. The university's research does not alter the Air Force's responsibilities of receiving, investigating and evaluating UFO reports.

Army To Improve Pershing Missile System

The U. S. Army Missile Command has begun a program to improve the design and increase the rate of fire and reliability of its Pershing missile system.

Under the improvement program, known as Pershing 1A, ground support equipment used in the countdown and launch of the missile will take on a new look, but the 34-foot-long missile will remain unchanged.

The most noticeable outward change will be the shift from tracked to wheeled vehicles for transporting the missile system. Reason for the change is to reduce vibrations of equipment during cross-country movement and to reduce cost using the less expensive wheeled models which require less maintenance.

There will be four firing batteries in a Pershing 1A battalion. A battery will have several missiles, each on an improved erector-launcher mounted on a flatbed semi-trailer truck. The two solid propulsion stages and the guidance and control section will be carried fully assembled with the warhead section on the same vehicle. The improved programmer test station/power station, radio terminal set and new firing battery control center will be hauled on five-ton trucks.